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JENKINSON (J. G.) & CAMPBELL (W.). **Scorch of winter Cauliflower.**—*Plant Path.*, 6, 3, pp. 92–94, 1 pl., 1957.

A condition of winter cauliflower known as 'scorch', prevalent for many years in S.W. England, has been responsible for heavy losses. The heart leaves fail to develop normally and become stunted and brown at the tips, with secondary bacterial rotting, which often leads to the death of the plant.

Symptoms usually appear 2 to 3 months after planting. The growth of the cells near the main vein at the tips of the young leaves is checked and they die. The area of dead cells spreads back at a rate depending on the weather and the extent of bacterial contamination; it is most rapid in mild, humid conditions. Symptoms usually reach their maximum at heading, when the heart leaves may be killed outright; the curds in such plants are small and generally rotted by bacteria. Scorched plants are extremely susceptible to frosting. Scorch also appears to be correlated with rate of growth and is greatest when the leaves are expanding rapidly.

Observations and experiments showed that it is an inherited character, the expression of which in the field is influenced by the level of inorganic N manuring. A number of genes may be involved. No information has so far been obtained as to the cause of the breakdown, which occurs on many different types of soil. Plants not showing symptoms should be carefully selected for mother seed, and where practicable the selected plants should be selfed and only those families used for seed which remain unaffected when grown with heavy inorganic N dressings.

COHEN (S. S.) & SCHACHMAN (H. K.). **Physical studies on the ribonucleic acid of Turnip yellow mosaic virus.**—*Virology*, 3, 3, pp. 575–586, 2 fig., 1957.

From studies at the Virus Laboratory, University of California, on turnip yellow mosaic virus it is concluded that there are perhaps 25 to 50 ribonucleic acid molecules in the virus particle.

SZIRMAI (J.). **Hazai tapasztalatok a Cukorrépa vírusos sárgaságának elterjedéséről és leküzdésének módjairól.** [Observation on the spread of the yellows virus of Sugar Beet and the possibility for its control.]—*Ann. Inst. Prot. Plant. Hung.*, 7 (1952–56), pp. 393–407, 2 pl., 1 graph, 1957. [Russian and German summaries.]

The occurrence in Hungary of beet yellows virus disease [map 261] was reported for the first time in 1952; many regions are affected, the commercial crop being severely attacked. The main insect vector is *Doralis* [*Aphis*] *fabae*, *Myzus persicae* being rarely observed. There was a definite connexion between vector numbers and the severity of the disease.

A distance of 1.5 km. between seed and root crops appears to be satisfactory to control the spread of infection. Virus infection in summer-sown seed crops was 50% lower than in the spring ones. Fields on high ground surrounded by trees seem the best sites for the crop.

BENNETT (C. W.) & TANRISEVER (A.). **Sugar Beet curly top disease in Turkey.**—*Plant Dis. Rept.*, 41, 9, pp. 721–725, 2 fig., 1957.

Sugar beet plants near Eokisehir were found to be infected by a strain of beet curly top virus [map 24]. As the only known vector of the virus, *Circulifer tenellus* [*Eutettix tenella*], is a native of the Mediterranean area, it seems probable that both virus and vector were introduced into N. America from that region.

BENNETT (C. W.). **Interactions of Sugar Beet curly top virus and an unusual mutant.**

—*Virology*, **3**, 2, pp. 322–342, 3 fig., 1957.

At the U.S. Agricultural Research Station, Salinas, California, a virus producing vein yellowing was found in a Turkish tobacco plant recovered from severe symptoms of [beet] curly top virus; it was designated 'yellow vein virus'. Its host range proved to be the same as that of curly top [35, p. 552] except that it was non-persistent in *Nicotiana glauca*; it was transmitted by *Circulifer tenellus* [*Eutettix tenella*], *Cuscuta*, and grafting, but not by sap inoculation or seed. The viruses have been transmitted together to tobacco, sugar beet, tomato, and other plants. Though producing no symptoms on sugar beet, the yellow vein virus was recovered from inoculated plants. The presence of yellow vein decreases the beet curly top component in tobacco. If yellow vein is dominant the plants are yellow and stunted, but if the curly top component is dominant they have curly, dwarfed, green leaves at first, recovering later; where evenly balanced, injury is slight. Immunity from yellow vein virus was observed in tobacco plants recovered from beet curly top. Typical vein yellowing was produced on *N. glauca*, immune from yellow vein virus, and on *Datura meteloides*, immune from both viruses, when supplied with carbohydrates and virus via infected Turkish tobacco scions. After removal of the scions the plants lost the viruses. The yellow vein virus is closely associated with the phloem and the transport of carbohydrates. It is suspected that it is a mutant strain of beet curly top which arose in tobacco infected by the latter.

HARRISON (B. D.). **Studies of the host range, properties, and mode of transmission of Beet ringspot virus.**—*Ann. appl. Biol.*, **45**, 3, pp. 462–472, 1 pl., 1957.

Work at the Scottish Horticultural Research Institute, Invergowrie, Dundee, on an apparently undescribed, mechanically transmissible virus occurring naturally in Scotland in sugar beet, turnip, swede, potato, and numerous weeds, and referred to as beet ring spot virus, showed that it is readily distinguishable from raspberry ring spot virus [cf. 35, pp. 349, 619] by the symptoms produced [which are tabulated] in *Chenopodium amaranticolor*, French bean (*Phaseolus vulgaris*), tobacco, and *Petunia hybrida*.

The young leaves of affected sugar beet seedlings develop chlorotic spots, and when mature often have 'etched' necrotic ring and line patterns. Infected plants grow slowly. The lesions in inoculated primary leaves of French bean in winter were brown necrotic spots, about 2 mm. diam.; in spring and autumn the spots had chlorotic centres surrounded by a tiny necrotic ring; in summer they were chlorotic and barely visible.

The virus lost infectivity when heated for 10 min. at 63° C., but not at 60°. Its longevity *in vitro* was 2–3 weeks. It was precipitated by ammonium sulphate, ethanol, and acetone. The dilution end-point was 1:1,000–1:5,000 when sap from severely affected tobacco leaves was diluted in distilled water and celite was mixed with the inoculum. The relative numbers of lesions produced by samples of infective tobacco sap diluted variously in distilled water or M/20 pH7 phosphate buffer showed that when fewer than 50 lesions/half leaf were present the number often decreased with dilution by more than the dilution factor. Preparations frozen at –10° for 4 months were still serologically active and highly infective.

No evidence was obtained in protection experiments and serological tests that the virus is related to the viruses of tobacco ring spot, raspberry ring spot, or tobacco rattle [strain of potato stem mottle]. Strains of beet ring spot were obtained from several hosts from different localities.

The virus is soil-borne; in glasshouse experiments sugar beet, beetroot, potato, turnip, swede, French bean, strawberry, oat, and wheat plants often developed systemic infection when grown in soil from the site of an outbreak, but in many of the affected plants the virus was confined to the roots. When sugar beet seedlings

were grown in affected soil, the virus was first detected in the roots where the concentration increased before progressively increasing amounts of the virus were located in the shoots. The virus was found only in light soils and was frequently present in fields containing raspberry ring spot virus.

McKAY (R.). **Field studies on the downy mildew of Sugar Beet.**—23 pp., 7 pl. (1 col.), 1 map, Irish Sugar Company, Ltd., Dublin, 1957.

In this research bulletin on *Peronospora schachtii* a general description is given, followed by sections on infection in *Beta maritima*, spread of infection from seed and stecklings, development of infection in seed plants from infected stecklings, and the question of seed infection. The prevalence of downy mildew in Ireland [32, p. 54] increased when beet and mangold seed crops began to be grown among root crops; the two types of crop are now segregated. Downy mildew is worse in dry, warm years with dew at night than in wet seasons, and occurs chiefly on the hills. Although *B. maritima* is a wild host it is a negligible source of infection. Though not proved, the evidence indicates seed transmission. The fungus is not truly systemic, but some diseased plants survive the winter and produce diseased shoots, generally followed by healthy ones. Copper spraying should be employed as soon as the disease appears in steckling beds; plots with over 10% disease should not be used for seed.

AGARKOV (V. A.). Сухой способ протравливания высадков Сахарной Свёклы. [A dry method of disinfecting Sugar Beet stecklings.]—Агробиология [Agrobiology, Moscow], 1957, 3, pp. 146–148, 1957.

In experiments during 1954–56 by the Kamenetz-Podol'sky Agricultural Institute, U.S.S.R., dipping sugar beet transplants in a dry mixture of granosan and slaked lime (1:15–17 if infection of the mother beet was weak, 1:10–12 if intermediate or heavy) controlled rust [*Uromyces betae*: 35, p. 259] under commercial conditions. It is recommended that the same mixture be applied later to plants in the field at 3:42–45 kg./ha. against slight infection or at 4:40–45 kg. where infection is heavier. The mixture is also effective against cercosporosis [*Cercospora beticola*: 35, p. 501] and phomosis [*Phoma betae*: loc. cit.].

EMONSON (K. H.). **Certified French Bean seed, the 1956–7 season.**—*J. Dep. Agric. Vict.*, 55, 10, pp. 647–648, 2 fig., 1957.

Bean seed [*Phaseolus vulgaris*] in Victoria is certified when crops have been rigorously inspected by Dept Agric. officers and neither anthracnose (*Colletotrichum lindemuthianum*) nor bacterial blights (*Pseudomonas medicaginis* var. [f.sp.] *phaseolicola* and *Xanthomonas phaseoli*) can be detected. In the 1956–7 season 526 acres were submitted for inspection and 163 passed for certification. Only bean seed crops growing in the East Gippsland area can be accepted for certification at present.

BURKE (D. W.). **Bacterial wilt of Pinto Beans on soils of different types and cropping histories.**—*Plant Dis. Repr.*, 41, 8, pp. 671–673, 1957.

Incidence of wilt (*Corynebacterium flaccumfaciens* or *C.f.* var. *aurantiacum*) [36, p. 444] of beans [*Phaseolus vulgaris*] in the vicinity of Greeley, Colorado, in 1955 was higher in plants experimentally wounded below the soil line than in those not injured. Plants in sandy loam were affected in all parts of the field regardless of cropping history, whereas infection in a clay loam was low, even where beans had been grown repeatedly. The bacteria survived in the soil for at least 2 winters between bean crops rotated with beet.

A suspension of *C.f.* var. *aurantiacum* was less effective in causing wilt of beans in non-sterilized clay loam in pots than in non-sterilized sandy loam, while the

reverse was true of sterilized soils. This suggests that the lower incidence of wilt in fields of clay loam is partly due to the greater suppressive action of the microflora on the pathogen in the finer textured soil.

WOOLLIAMS (G. E.). **Downy mildew of Onions and its control in the British Columbia interior.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 3, pp. 237–244, 1957.

Since the first appearance of the disease 15 years ago, onion downy mildew (*Peronospora destructor*) [23, p. 3] has damaged the crop in nearly every season in the semi-arid interior of British Columbia. The best control in autumn planted, spring planted, and seed onions was given by zineb sprays (2 lb./100 gal.) with a wetter. To obtain effective control it is essential to apply the spray at the first appearance of mildew in the area.

YAMAMOTO (W.), OYASU (N.), & IWASAKI (A.). **Studies on the leaf blight disease of *Allium* spp. caused by *Botrytis* and *Botryotinia* fungi. I.**—*Sci. Rep. Hyogo Univ. Agric., Ser. Agric. Biol.*, **2**, 2, pp. 17–22, 1956. [Japanese. Abs. from English summary. Received 1957.]

A description is given of a *Botrytis*-like fungus affecting onion leaves in the Osaka and Hyogo prefectures, causing water-soaked, elongated lesions which become covered with conidia in humid weather and black sclerotia under drier conditions. The fungus is considered to be identical with *B. byssoidea* in the conidial state, and with *Sclerotinia allii* in the ascigerous one, and is renamed *Botryotinia allii* (Sawada) Yamamoto.

SRIVASTAVA (S. N. S.). ***Centrospora acerina* on Carrot.**—*Plant Path.*, **6**, 3, p. 113, 1957.

Carrots from a market-garden near Edinburgh, sown in March 1956 and lifted in Apr. 1957, had 5% root infection by *C. acerina* [cf. 35, p. 808]. No known host of the fungus had been grown in the field before. This appears to be the first record of *C. acerina* in Scotland.

MUKULA (J.). **On the decay of stored Carrots in Finland.**—*Acta agric. scand., Suppl.* **2**, 132 pp., 20 fig., 1957. [5½ pp. refs.]

During the storage seasons 1948–9 to 1956–7 at the Agricultural Research Centre, Tikkurila, material for study was obtained from south, central, and north Finland. At about 4° C. and R.H. 90%, an average of 30% total decay was calculated after 6 months' storage. The differences in the keeping qualities were apparently due, partly at least, to the varying climatic and transport conditions. Of the pathogens isolated [30, p. 301], 4 proved to be the most important: the average share of *Sclerotinia sclerotiorum* rot in the 30% decay was 43%, that of *Botrytis cinerea* 33%, *Stemphylium-Fusarium* (*S. radicinum* and/or *F. avenaceum*) 23%, and other rots 1%. Contamination by *Stemphylium-Fusarium* and *S. sclerotiorum* was found to be soil borne, increasing as a result of successive carrot cultivation in the same field; that due to *B. cinerea* arose also from the storage air. Heavy K fertilizing increased, in 1 of the 4 years, the rots due to *S. sclerotiorum* and *B. cinerea*, while heavy liming decreased the *Stemphylium-Fusarium* rot in 1 of the years.

The resistance of Chantenay carrots to *Sclerotinia sclerotiorum* and *B. cinerea* increased with growing age, while it decreased to *Stemphylium-Fusarium*. In other varieties also there was a slight increase in resistance to *Sclerotinia sclerotiorum* and *B. cinerea* with increasing age. To *Stemphylium-Fusarium* all the tested varieties showed the greatest resistance with late sowing. When stored in thick layers small Chantenay carrots were more susceptible to *Sclerotinia sclerotiorum* and *B. cinerea* than large ones of the same age. Occasionally the very early variety Pariser showed

a significantly greater susceptibility to *S. sclerotiorum* and *B. cinerea* than the other tested varieties. In most of the experiments Pariser exhibited the greatest susceptibility to *Stemphylium-Fusarium*, with Nantes, Gousenheimer, Guerande, Amsterdammer, and Chantenay (all middle-season) coming next in order, while the greatest resistance was shown by the very late Amager and Regulus.

A rise in storage temperature and in R.H. decidedly promoted decay, 0° C. and 90–95% R.H. proving the most suitable for storage.

Of the tested fungicides tecnazene gave the best results. At 12 g./100 kg. it enabled the bulk storage of carrots in high bins without danger of attacks by *Sclerotinia sclerotiorum* or *B. cinerea*, which were also inhibited by dipping the washed and surface-dried carrots into heated (115°) paraffin.

Nitrobenzene preparations, as well as carrier dusts, increased sprouting. The tested arylcarbamates, a mixture of tecnazene and isopropyl N-phenylcarbamate (IPC), the methyl ester of α -naphthalenacetic acid (MeNA), and the heat-paraffin treatment all prevented it. Flavour was slightly impaired by tecnazene; tecnazene plus IPC and also the heat-paraffin treatment improved it.

GLOMERA (V. S.). **Phyllosticta leaf spot and fruit rot of Eggplant.**—*Philipp. Agric.*, **41**, 1–2, pp. 37–52, 7 fig., 1957.

At the College of Agriculture, University of the Philippines, leaf lesions caused by *P. hortorum* on eggplant were circular or irregular, and brown, with a greyish centre where pycnidia were produced. Fruits were successfully wound inoculated at all stages of development, the infected areas being sunken and brownish. Of the varieties inoculated, only Long Native Purple was susceptible (slightly). Tomatoes developed slight infection and may serve as an alternative host.

WALKER (J.). **Diseases of Parsnips.**—*Agric. Gaz. N.S.W.*, **68**, 8, pp. 404–406, 5 fig., 1957.

Canker (*Itersonia* sp.) causes losses of up to 70% in autumn-sown crops in the Sydney Metropolitan area [35, p. 352]. The first symptoms are leaf spots on the young plants. *Ramularia pastinacae* [35, p. 504], causing a similar leaf spot but without a yellow halo, may generally be controlled by Bordeaux 1:1:20. Soft rot [*Erwinia carotovora*] can be reduced by improved packing conditions.

GEORGE (J. A.) & RICHARDSON (J. K.). **Aster yellows on Celery in Ontario.**—*Canad. J. Pl. Sci.* (formerly *Canad. J. agric. Sci.*), **37**, 2, pp. 132–135, 4 fig., 1957.

Studies at the Entomology and Botany and Plant Pathology Divisions, Science Service, Ottawa, showed that the celery disease reported from the Niagara Peninsula in 1953 was caused by aster yellows virus [34, p. 629]. Transmission under controlled conditions to various host plants by caging on them the leafhoppers *Macrostelus fascifrons* and *Fieberiella florii*, fed on diseased asters for 25 days, indicated that the strain of the virus present in Ontario was similar to that occurring in California [36, p. 164]. *M. fascifrons* frequents a wide range of hosts, celery in particular, throughout Ontario, where it is regarded as the most important vector of the disease.

VAN GUNDY (S. D.) & WALKER (J. C.). **Relation of temperature and host nutrition to angular leaf spot of Cucumber.**—*Phytopathology*, **47**, 10, pp. 615–619, 1957.

The results are presented of a study at the University of Wisconsin, Madison, on the growth of 6 isolates of *Pseudomonas lacrymans* [36, p. 677] from widely separated areas. The isolates behaved similarly. Inorganic salts were not used as a source of N; glutamine or asparagine gave the best growth. With 100 μ g. N/ml., 8 mg./ml. of sucrose was necessary for max. growth; above 200 μ g. N/ml., 1 mg./ml. or less of sugar was required.

With balanced nutrient old leaves of plants in soil in the greenhouse were resistant and young maturing leaves the most susceptible, the former being low and the latter high in amino-N. Increase of N supplied to inoculated plants at the highest N level (528 p.p.m.) increased the amino-N content of both old and young leaves to above 200 $\mu\text{g./g.}$ of fresh tissue and the disease index increased in proportion. Reduction of K to 1 p.p.m. resulted in an almost equally high disease index as with high N, and a high amino-N content of old leaves in particular. Variation in P had no effect. There was no consistent correlation between carbohydrate content and disease index.

Exposure of inoculated plants to 4 temp. treatments resulted in max. disease when a day temp. of 16° C. was followed by a night temp. of 28° (12 hr. of each); disease was successively less at 16° continuously, 28° continuously, and 28° day with 16° night. Amino-N in the leaves was greatest in the 16-28° treatment, lessening successively through 16° continuously, 28-16°, and 28° continuously, and was of more importance in its effect on disease severity than carbohydrate.

KENDRICK (J. B.), WEDDING (R. T.), KORTSEN (R. A.), MIDDLETON (J. T.), WHITAKER (T. W.), BOHN (G. W.), & PAULUS (A. O.). **Cantaloupe crown blight study.**

WEDDING (R. T.), KENDRICK (J. B.), MIDDLETON (J. T.), WHITAKER (J. W.), BOHN (G. W.), KORTSEN (R. A.), & PAULUS (A. O.). **Crown blight of Cantaloupe.**—*Calif. Agric.*, 11, 5, pp. 5-6, 1 fig.; 6, pp. 5-7, 2 fig., 1957.

The 1st of these papers deals with the geographical distribution of a disease generally associated with the presence of decayed roots. First the oldest leaves on the runners and then the younger ones are affected by severe chlorosis leading to shrivelling and death, which deprives the fruits of shade, causing them to become sunburned and unmarketable. The disorder occurs in all districts of California and Arizona where there is winter planting and spring harvesting. In the spring seasons 1955-57 the disease was particularly serious in the Yuma and Salt River Valley areas of Arizona, and in the Imperial Valley, California.

The 2nd paper describes a series of studies of possible causes of the disease, a number of which indicated inadequacy of the root system. Pruning the root system of a healthy plant at a radius of 12 in. from the crown induced more or less typical symptoms in 7-10 days, while on plants from which either all developing fruits or all but 2 were removed the symptoms were, respectively, absent or delayed by 10-14 days. It was also found that by careful attention to irrigation the appearance of symptoms could be delayed and the yield increased.

In experiments with both soil temperature and soil moisture as variables there was a highly significant correlation between crown blight rating and numbers of dead roots, and a high correlation between the weight and number of live roots and both temperature (degree-days above 60° F. base) and percentage soil moisture. An increase in the number of dead roots preceded the appearance of crown blight in those plots with the earliest and most severe symptoms, and the populations of several [unspecified] fungal species were correlated with both disease ratings and the numbers of dead roots. Artificial inoculation with several fungi (*Fusarium*, *Pythium*, *Rhizoctonia* and *Sclerotium*) associated with cantaloupe roots, bulked on sterile grain, did not increase the incidence or severity of the disease, and previous fumigation of the beds with vapam was also without effect.

It is suggested that crown blight results from inability of the root system to supply sufficient water for both the leaves and the developing fruits. The inadequacy of the roots is probably due in part to the activity of soil pathogens favoured by cool and moist conditions.

IVANOFF (S. S.). **Powdery mildew pimples on Watermelon fruits.**—*Phytopathology*, **47**, 10, pp. 599–602, 2 fig., 1957.

At Mississippi Agricultural Experiment Station, State College, it was shown that hyperplastic pimples on watermelon fruits were caused by a powdery mildew, probably *Erysiphe cichoracearum*, though perithecia were not obtained. Similar excrescences have previously been associated with tobacco ring spot virus [36, p. 299]. Dipping young fruits in karathane (1:2000, with addition of triton B-1956) prevented the occurrence of the condition.

MURAKISHI (H. H.), POTTER (H. S.), & RUSHMORE (W. L.). **The cause and control of post-harvest leaf breakdown of hothouse Rhubarb.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **40**, 1, pp. 147–153, 1957.

The leaves packed with hothouse rhubarb in Michigan may become watersoaked and covered with brownish-grey conidial fructifications. *Botrytis cinerea* was either sporulating abundantly or developed in 48–72 hr. in a moist chamber. Post-harvest fungicide dips were ineffective, but pre-harvest spraying with manzate showed promise. Destruction of cull piles by burning is recommended.

DUNLEAVY (J.). **Variation in pathogenicity of Diaporthe phaseolorum var. sojae to Soybean.**—*Iowa St. Coll. J. Sci.*, **32**, 1, pp. 105–109, 1 fig., 1957.

In tests at the Agricultural Experiment Station, Ames, Iowa, a strain of *Diaporthe phaseolorum* var. *sojae*, isolated from pycnidia on a dead petiole at the base of a living stem, and another from a light brown stem lesion (1 × 0.25 in., and lacking the usual dark margin) on an actively growing stem were compared by the toothpick method [cf. 36, p. 447] for pathogenicity to 60- and 80-day plants of Hawkeye and 100-day plants of Lincoln. A highly pathogenic isolate of *D.p.* var. *caulivora* served for comparison. On all plants the first isolate was more pathogenic than the second, though less so than *D.p.* var. *caulivora*. During a drought in August and September field grown plants were killed by *D.p.* var. *sojae*.

MACNEILL (B. H.) & ZALASKY (H.). **Histological study of host-parasite relationships between Septoria glycines Hemmi and Soybean leaves and pods.**—*Canad. J. Bot.*, **34**, 4, pp. 501–505, 1957.

This is an expanded account of histological studies on the infection of soybean by *Septoria glycines*, which have already been noticed [35, p. 66].

BOOSALIS (M. G.) & HAMILTON (R. I.). **Root and stem rot of Soybean caused by Corynespora cassiicola (Berk. & Curt.) Wei.**—*Plant Dis. Reptr.*, **41**, 8, pp. 696–698, 1957.

C. cassiicola was found to cause a previously undescribed disease of soybean [33, p. 525] near Fremont, Nebraska, in 1954. Dark, reddish-brown lesions on the hypocotyl and roots changed to dark violet-brown with age; severely infected plants were stunted. The lesions were only superficial and seldom extended beyond the first three parenchymatous cell layers of the cortex on naturally infected plants. No leaf symptoms were found in the field though they developed on inoculated plants in the greenhouse. Field surveys and experiments suggested that a soil temperature above 19–21° C. arrests the development of the disease before it causes any appreciable damage. The pathogen overwinters on infected roots and stems and can survive in infested, unsterilized soil for at least 2 years. Incidence was highest in fields where soybean had been planted for 2 successive years.

VUITTENEZ (M. A.). **Lutte préventive contre le court-noué de la Vigne par la désinfection chimique du sol avant plantation.** [Preventive control of court-noué of

the Vine by chemical disinfection of the soil before planting.]—*C.R. Acad. Agric. Fr.*, **43**, 4, pp. 185–196, 1957.

At the Station de Pathologie Végétale, Colmar, a vineyard heavily infected by court-noué was divided into plots which were chemically disinfected by various means in 1953 before replanting with young vines. Any infected young plants were removed at an early stage. From 1954–56 the growth of the young vines was measured in July and the foliage examined for symptoms.

DD at 11.4 kg./ha., a methyl bromide mixture (10% methyl bromide, 20% carbon tetrachloride, 70% dichlorethane) at 37.9 kg./ha., and carbon disulphide at 30.2 kg./ha. effectively prevented the infection of the young plantings, DD being the most effective. A preliminary examination of fragments of small roots left in the soil after grubbing out the old vines showed that DD had killed 95% in 5 months, the other treatments being less effective. It was noteworthy that the best treatments were also highly active against nematodes.

BRANAS (J.). **La carence de bore.** [Boron deficiency.]

BRANAS (J.) & BERNON (G.). **La carence de bore dans les vignobles français.** [Boron deficiency in French vineyards.]—*Progr. agric. vitic.*, **72**, 40–41, pp. 191–195, 1955; **73**, 53, pp. 414–419, 1 fig., 1956.

After noting the regions in which the condition is encountered and the vine varieties affected, the authors describe soil and foliage treatments and the toxic symptoms following over-treatment. They recommend soil treatment, restricted to the affected plants, with cheap commercial borax and not proprietary fertilizers incorporating it [cf. **34**, p. 766].

Fourth Annual Report, 1956–7, Scottish Horticultural Research Institute.—55 pp., 1 pl., 2 maps, 1957.

In the plant pathology section (pp. 25–32) [cf. **35**, p. 873] B. D. HARRISON states that a sap-transmissible virus of the ring spot type from diseased Malling Exploit raspberry plants grown at Bere Ferrers, Devonshire [cf. **35**, p. 349], has been named 'raspberry yellow dwarf virus'. The leaves of affected plants bear yellow markings on the veins, and the plants become stunted and may die. C. H. CADMAN reports that *Amphorophora rubi*, the principal vector of virus diseases of cultivated raspberries and other *Rubus* spp., acquires virus after feeding for 30 min. or more on infected plants. Infectivity increases with increase of acquisition feeding periods up to 4 hr., but after transfer to healthy plants the aphids lose their infectivity in 4–5 hr. Lloyd George raspberries readily became infected by both leaf spot virus and veinbanding virus [cf. **36**, pp. 107, 198], whereas Malling Promise and Malling Exploit were more susceptible to the former than the latter, and Norfolk Giant more to the latter. Grafting experiments demonstrated that plants of the cultivated blackberries Bedford Giant, Ashton Cross, John Innes, Himalaya Giant, and Parsley-leaved were all infected by mixtures of viruses that produced severe stunting and necrotic effects on Norfolk Giant raspberry, and from them viruses were transmitted to healthy *R. occidentalis* seedlings by *A. rubi*. Ashton Cross, John Innes, and Parsley-leaved plants, inoculated by grafting with latent viruses which cause no symptoms on most raspberry varieties, developed severe stunting and necrosis.

In grafting experiments by R. M. LISTER Talisman and Red Gauntlet strawberries developed severe symptoms when infected by the viruses of yellow edge or crinkle. Localized outbreaks of phyllody in clover [cf. **34**, p. 807] were frequent in Angus and Perthshire. *Euscelis plebeius*, the commonest leafhopper collected in affected areas, transmitted the virus to red clover in the glasshouse.

B. D. HARRISON rendered green peach aphids [*Myzus persicae*] infective by

injecting into them the blood of aphids that had fed on plants infected by the viruses of potato leaf roll or beet yellow net. Aphids sometimes transmitted leaf roll virus to test plants within 1 day of injection, but usually transmission did not occur until the 2nd or 3rd day, continuing for periods of up to 20 days. Potato leaf roll virus did not appear to multiply in the aphids.

A. G. FISKEN confirmed during the winter of 1955-6 that *Brassica* crops, particularly spring cabbage and cabbage grown for seed, are the chief hosts on which *M. persicae* overwinters in eastern Scotland; peaches under glass appeared to be of minor importance, though they were infested at 70% of the sites visited.

In the mycology section (p. 33) W. R. JARVIS states that the growth in culture of different physiologic races of *Phytophthora fragariae* was identical, except when certain phenolic compounds, including analogues of strawberry root constituents, were added to the media. The races differed in their ability to utilize caffeic acid, *d*-catechin, and pyrocatechol.

In the main raspberry plantation continuous thermohygrograph records are being taken 0.5 m. above ground level, the height of the orifice of a Hirst automatic spore trap on the same site. Small numbers of ascospores of *Didymella applanata* and *Elsinoe veneta* were trapped throughout the summer and early autumn, usually when the R.H. exceeded 70% and temperatures above 12° C. prevailed for at least 12 hr. Preliminary results with a Gregory portable spore trap [cf. 34, p. 664] suggest that micro-climatic factors have a major effect on the production and dispersal of the spores of *Botrytis cinerea*. In commercial raspberry plantations the frequency of fruit picking affected the incidence of grey mould by varying the number of spore-bearing, infected berries; thus in rainy weather high humidity and the cessation of picking generally resulted in an increase in the number of spores in the air.

WILLIAMS (P. H.), READ (W. H.), HUGHES (J. T.), & SMITH (R. J.). **Plant pathology. Crop protection.**—*Rep. Glasshouse Crops Res. Inst. 1954-5*, pp. 44-46; 51-54, 1 graph, 1957.

In the report of this Institute, formerly the Experimental and Research Station, Cheshunt [cf. 35, p. 656], now at Littlehampton, Sussex, P. H. WILLIAMS reviews the work done on plant pathology, including tomato stem rot (*Didymella lycopersici*), carnation wilt (*Verticillium cinerescens*, *Fusarium dianthi*, and other organisms) [cf. 35, p. 767; 36, p. 762], and La France disease of mushrooms [36, p. 511]. Pure cultures of cucumber mildew (*Erysiphe cichoracearum*) were maintained satisfactorily on cucumber plants grown under sterile conditions in large test-tubes. R. HOWLES reports that [tobacco mosaic] virus in tomato seed was again inactivated by a 6-day treatment in saturated 2-chlorophenoxyacetic acid. Soil applications of 0.013% solutions of 3-chlorophenoxyacetic acid and 2,4-D reduced infection of chrysanthemum cuttings by chrysanthemum flower-distorting [? tomato aspermy] virus from 100% to 7% and 22%, respectively.

W. H. READ, J. T. HUGHES, and R. J. SMITH state that against *E. cichoracearum* on cucumbers 2% karathane dust [cf. 34, p. 572] at 15 lb./acre every 10 days was less injurious to the plants than a 0.012% (w/v) spray formulation at intervals of 3 weeks, and was very economical as regards labour when a modern, compressed-air duster was used.

KLEMM (M.), MASURAT (G.), & STEPHAN (S.). **Das Auftreten der wichtigsten Krankheiten und Schädlinge der Kulturpflanzen im Jahre 1953 im Bereich der Deutschen Demokratischen Republik.** [The occurrence of the most important diseases and pests of cultivated plants in the year 1953 in the zone of the German Democratic Republic.]—*NachrBl. dtsh. PflSchDienst, Berl.*, N.F., 11, 5, pp. 81-104, 2 graphs, 37 maps, 1957.

In 1953 [cf. 35, p. 748] barley smut (*Ustilago nuda*) [*U. tritici*] was widespread and

severe, while maize smut (*U. zeae*) [*U. maydis*] was reported frequently from Potsdam and Frankfurt/Oder. Foot rots of cereals (*Ophiobolus graminis*, *Cercospora herpotrichoides*, etc.) were serious in Mecklenburg. Black leg [*Erwinia* spp.: **34**, p. 479] of potatoes caused important losses in almost all regions, as also did virus diseases.

Root diseases of beet (*Phoma betae*, *Pythium debaryanum*, *Aphanomyces laevis*, etc.) were more frequent than in the previous year and severest in Mecklenburg and Saxony. Beet yellows [virus] spread farther, heavy infection being reported for the first time in the northern parts of the Frankfurt/Oder and Cottbus regions. There were strong local attacks of girth scab [**36**, p. 743] in Halle, Leipzig, and Karl-Marx-Stadt. Powdery mildew of clover (*Erysiphe martii*) [*E. polygoni*: cf. **28**, p. 114; **33**, p. 410] was severe in Karl-Marx-Stadt and Dresden.

SIBILIA (C.). **Rassegna dei casi fitopatologici più notevoli osservati nel 1956.**

[Review of the most noteworthy phytopathological records observed in 1956.]

—*Bol. Staz. Pat. veg.*, Roma, Ser. 3, **14** (1956), 2, pp. 347–365, 1957.

This report from Italy [cf. **36**, p. 574] contains, among others, the following items of interest. Olive fruits at Cagliari were attacked by *Sphaeropsis dalmatica* [cf. **33**, p. 307]. Orange branches and young trunks at Catanzaro were attacked by a *Fusarium*, probably *F. lateritium* [cf. **34**, p. 377]. Leaves of *Quercus ilex* near Rome were infected by *Phyllosticta ilicina* [**25**, p. 539], and sugar beet at Catanzaro by *Peronospora schachtii*. Tobacco seedlings, Bright variety, line 22, developed collar rot due to *Thielaviopsis basicola*. Azaleas near Rome developed a wilting of the leaves, caused by *Septoria azaleae* [cf. **33**, p. 437]. Geranium [*Pelargonium*] leaves from Benevento were attacked by *Xanthomonas pelargonii* [cf. **34**, p. 210].

TARR (S. A. J.). **Recent observations on plant diseases in the Sudan.**—*F.A.O. Pl. Prot. Bull.*, **5**, 12, pp. 188–190, 1957.

Sclerospora sorghi [**36**, p. 752; map 179] attacked sorghum, millet [*Pennisetum typhoides*], Sudan grass, and wild species of *Sorghum* in the Gedaref and Kassala areas. Maize rust (*Puccinia polysora*) [**36**, p. 752] was widespread in the south. *Pennisetum typhoides* in the Kordofan sands area of the west central Sudan has in recent years been attacked by *Sphacelia* sp. Experimental rice plots at Malakal (central Sudan) developed widespread wilt in July–Aug. 1956. In Sept. some plants began to recover. The affected plants were small and appeared likely to head late. The condition may have been due to high soil alkalinity possibly combined with low nitrogen. Leaf spots of rice (*Stagonospora oryzae* and *Hendersonia* ? *oryzae*) were noted, but their economic significance is unknown. Ring spot (*Leptosphaeria sacchari*) [map 330] was found in a small plantation of sugarcane in the south-west.

Other records include red rust (*Cephaleuros* sp.) on orange, lime, and guava. *Pseudomonas mangiferae-indicae* (apparently) and *Pestalotiopsis japonica* were found on mango leaves for the first time in the Sudan. Perithecia of *Sphaerotheca fuliginea* were found on the weed *Acalypha indica* in the central rainlands area. Perithecia of *S. humuli* were present on *Bidens bipinnata* in the Jebel Marra area, several thousand feet above sea-level; this is the first record of this fungus for the Sudan. Typical symptoms of tobacco leaf curl virus were observed on perennial bushes of *Vernonia* sp. in the south-west.

Among recently discovered diseases of other crops are tobacco brown spot (*Alternaria longipes*) [map 63], peach rust (*Puccinia* [*Tranzschelia*] *pruni-spinosae*) [map 223], and tomato leaf spot (*Stemphylium solani*) [map 333].

Report of the Department of Agriculture, Sierra Leone, for the year 1955.—45 pp., 1957.

In the plant pathology section (pp. 41–42) [cf. **36**, p. 381] it is stated that no fungi

of economic importance were isolated in a survey of soils from cacao farms, but *Cunninghamella elegans* and *Fusarium solani* were common, the latter being a new record for Sierra Leone.

A banana leaf spot, probably caused by *Mycosphaerella musicola*, not previously recorded in Sierra Leone [map 7], was observed in the Port Loko and Kambia districts.

Report of the Tanganyika Agricultural Corporation for the year ended 30th September 1956.—107 pp., 1 map, 1957. 10s.

In the plant pathology section (p. 22) [cf. **36**, p. 381] it is noted that the incidence of *Cercospora* leaf spots [*Mycosphaerella arachidicola* and *M. berkeleyi*] on the groundnut crop was slight; Mwitunde continued to show a good measure of resistance. *Puccinia polysora* reached its usual epidemic proportions on all maize crops and caused considerable losses of yield in the later planted fields.

Annual Report of the Department of Agricultural Research (Federation of Nigeria) for the year 1955-6.—24 pp., 1957. 9d.

In the report by the Director, J. M. WATERSTON (pp. 5-10) [cf. **36**, p. 682], it is stated that during the period under review the number of cacao growers using fungicidal sprays probably rose to over 25,000. The amount of cacao saved from destruction by black pod (*Phytophthora palmivora*) is estimated at over 7,000 tons in a single Province, or more than enough to pay for all imported chemicals and equipment.

In the plant pathology section (pp. 16-17) S. R. CHANT suggests that the better yield of Oloronto cassava, compared with Karagba and NL 5 in a field experiment, may have been due in part to the fact that its leaves were less severely affected by mosaic virus; if this is confirmed, it may serve as a further guide in the breeding of tolerant varieties. The virus was transmitted by patch grafting with stem tissue, though not by leaf grafts. Incidence of cacao seedling wilt [*Phytophthora palmivora*: see below] was much affected by the type of soil and was greater under heavy than under light shade.

Dealing with the maize rust [*Puccinia polysora*] research scheme (pp. 17-18) [cf. **37**, p. 159], W. R. STANTON & R. H. CAMMACK state that when derivatives of Mexico 13 were inoculated with rust from Ibadan and Ghana differential reactions were obtained. Further tests demonstrated the presence of a new physiologic form [**35**, p. 418].

HOPKINS (J. C. F.). **Plant diseases in British Colonial Dependencies.**—*F.A.O. Pl. Prot. Bull.*, **6**, 1, p. 9, 1957.

Two fungi have been found in association with a spotting of grapefruit in the Lopinot Valley, Trinidad, one producing a *Mycosphaerella* perfect state, the other, possibly, *Guignardia citricarpa*.

In Nigeria imported maize varieties resistant to *Puccinia polysora* [see above] were seriously affected by a new disease, suspected to be of virus origin, resembling Stoner's maize leaf fleck virus in the United States [**32**, p. 554]. Effective control of a serious wilt of seedling cacao caused by *Phytophthora palmivora* [see above] was given by 0.3-0.5% perenox sprays at 3-day intervals from germination until the plants were 6 weeks old. At Moor Plantation yams were attacked by a suspected virus disease [**36**, p. 683], white varieties being more susceptible than yellow. *Fomes noxius* and *Macrophomina phaseoli* were isolated from 1-year-old citrus seedlings. A leaf spot of young *Hevea* rubber was provisionally identified as due to *Helminthosporium heveae*.

Department of Agriculture in Mysore State. Annual administration report for 1953-54. Part I.—163 pp., 1956. [Received Sept. 1957.]

In the section on plant pathology [pp. 79-81] it is noted that good results in the

control of koleroga disease (*Phytophthora arecae*) [34, p. 517] of areca palm were obtained with 4 fungicides—wetcol 15, cupravit-ob 21, coppesan, and perenox. Fermate controlled jowar [sorghum] smut (*Sphacelotheca sorghi*) [33, p. 524] satisfactorily, and sulphur, agrosan G.N., and arasan were also promising, as was soaking the seeds in cold water for 12 hr. Early spraying with cupravit (8 oz./10 gal.) controlled downy mildew (*Pseudoperonospora cubensis*) of cucurbits [33, p. 66]. *Leveillula taurica* is recorded for the first time on *Solanum torvum*.

VENKATARAYAN (S. V.). Report of the work done in the plant pathology section during the year ended March 1952.—*Rep. Dep. Agric. Mysore*, part II, 1951–52, pp. 153–158, 1956. [Received Sept. 1957.]

Much of the information in this report has already been noticed [cf. 36, p. 518]. No fungi or bacteria have been isolated from the roots of areca palm affected by 'hidimundige roga'. The disease spread to the malnad areas and was present near Sringeri. The outer leaves turn yellowish, the crown is smaller than normal, and in the early stages affected palms bear small bunches with poor quality nuts. Later, bearing ceases, the crowns fall, and the tree dies. A similar disease in Bombay is attributed to excess Mn and Fe.

Search for oospores of *Plasmopara viticola* [36, p. 86] has been unsuccessful. Green-ear disease (*Sclerospora* sp.) is severe in transplanted ragi [*Eleusine coracana*: 35, p. 528]. Seed treatment with fermate appeared to give some control of *Fusarium* wilt of coriander [34, p. 81].

Bordeaux mixture (1%) used twice (at 3–4 weeks and again 2–3 weeks later) against potato early blight (*Alternaria solani*) [34, p. 517] with $\frac{1}{2}$ % groundnut oil and resin adhesives at 2 lb./25 gal. increased yields by 4–23%. Calcium arsenate at 1 lb./50 gal. gave increases of 20% on occasion.

Colletotrichum sp. was isolated from leaf spots of jasmine. Powdery mildew of mango (*Oidium mangiferae*) [33, p. 542] was controlled and good crop retention obtained after spraying with 1% Bordeaux followed by fernasul (1 gal./60 gal. water).

MORWOOD (R. B.). Notes on plant diseases listed for Fiji.—*Agric. J. Fiji*, 27, 3–4, pp. 83–86, 1956. [Received 1957.]

These notes supplement the writer's preliminary list of plant diseases [36, p. 3].

Panama disease (*Fusarium* [oxysporum f.] *cubense*) of banana, previously recorded in Fiji, has not been seen by the writer; anthracnose [*Gloeosporium musarum*] occurs extensively on ripening banana fruit; though *Nigrospora sphaerica* is commonly to be found on necrotic banana tissue, squinter disease is not prevalent; bunchy top virus causes an annual loss of some 5% of the crop.

Sclerotinia sclerotiorum damages the foliage of many legumes and causes loss of carrots in the cooler months. *Botryodiplodia theobromae* commonly causes pod rot of cacao and is associated with seedling dieback and root rot; *Phytophthora palmivora*, though recorded, has not been seen on cacao by the writer, but causes serious fruit and root rots of papaw. *Bacterium carotovorum* [*Erwinia carotovora*] is the cause of heavy loss of carrots in warmer months. Citrus canker (*Xanthomonas citri*) [34, p. 780] has not yet been controlled in spite of the compulsory eradication. Bud rot of coconut (*P. palmivora*) killed dwarf coconuts in a high, humid area, favourable for the disease, where tall palms were not affected [cf. 37, p. 7]. Lightning injury is the principal cause of loss among coconuts. The coffee industry has been destroyed in the past by rust (*Hemileia vastatrix*), which can now be controlled by copper sprays. *Cercospora cruenta* can cause serious damage on cowpea. Powdery mildew [*Erysiphe cichoracearum*] affects the growth and yield of pumpkins and cucumbers, while anthracnose [*Colletotrichum lagenarium*] is the most serious disease of watermelons.

Dalo [*Colocasia esculenta*] has not been found affected by *P. colocasiae* [cf. **33**, p. 280] which is now considered not to occur in Fiji. Heavy losses of potato crops are caused by *Fusarium* wilt [*F. oxysporum*] and bacterial wilt [*Pseudomonas solanacearum*], the latter and *Cladosporium fulvum* also being troublesome on tomatoes. Occasionally rice crops suffer a 10% loss from *Ustilaginoidea virens*. Fiji disease virus and downy mildew [*Sclerospora sacchari*] on sugarcane are controlled by roguing, and hot water treatment is used against ratoon stunting virus.

ORIAN (G.). **Plant Pathology Division.**—*Rep. Dep. Agric. Mauritius, 1955*, pp. 90–93, 1957.

Most of the information on sugarcane diseases in this report [cf. **35**, p. 750] has been noticed [cf. **36**, p. 616]. *Xanthomonas rubrilineans* [**35**, p. 846] was found infecting a maize plant. Maize rust (*Puccinia polysora*) [map 237] was found to be severe in Rodrigues Island and was also collected in Agalega Island, but does not appear to have yet reached the Chagos Islands. The disease formerly referred to as citrus decline has been identified as citrus tristeza virus disease [map 289]. *Sphaerostilbe repens*, as *Dialonectria* sp., was found associated with a root disease in an experimental tea plot. *P. antirrhini* on antirrhinum has been recorded for the first time.

SIMMONDS (J. H.). **Science Branch, Plant Pathology Section.**—*Rep. Dep. Agric. Qd, 1956–57*, pp. 63–64, 1957.

The year under review in this report [cf. **36**, p. 307] was exceptionally dry in S. Queensland and powdery mildew (*Erysiphe graminis*) was prominent on canary grass [*Phalaris canariensis*: cf. **35**, p. 661], wheat [**34**, p. 136], and barley [**34**, p. 362].

The cowpeas C.P.I. 12153, Blackeye 5, Malabar, and C.P.I. 12148 again proved resistant to *Phytophthora* sp.

Mercurial seed dressings are more successful against *Rhizopus arrhizus* than against *Aspergillus niger* on groundnut [**34**, p. 125].

Home-made cuprous oxide+white oil proved reasonably effective as a spray against citrus black spot (*Guignardia citricarpa*) [cf. **34**, p. 284]. Bordeaux or zineb with white oil were inferior. Further attempts to control brown spot of the Emperor mandarin [cause uncertain: cf. **37**, p. 134] showed home-made cuprous oxide+white oil to be better than zineb, but only 50% control was achieved.

A pre-planting treatment with Bordeaux (1–1–3) gave good control for 8 weeks of pineapple top rot (*P. cinnamomi*) [**34**, p. 136] and exerted some effect for as long as 6 months. An F_1 *Fusarium* resistant tomato hybrid, Burwood Prize \times Manalucie, also proved resistant to *Cladosporium fulvum*.

CONNERS (I. L.), SHOEMAKER (R. A.), & CREELMAN (D. W.). **Thirty-sixth Annual Report of the Canadian Plant Disease Survey, 1956.**—xxix+134 pp., 1957. [Mimeoprinted.]

In the section [duplicated in French] on new or noteworthy diseases (pp. ii–x) [cf. **35**, p. 876] it is stated that scald (*Rhynchosporium secalis*) [**35**, p. 418] is the most serious leaf disease of barley in Alberta.

Lucerne and red clover in Ontario were affected by a disease similar to the lucerne crown bud rot (*Rhizoctonia* [*Corticium*] *solani* and *Fusarium* spp.) [cf. **35**, p. 102; **37**, p. 50] known in Alberta. Severe damage was caused to soybean in S.W. Ontario by an undetermined species of *Phytophthora*, causing a root and stalk rot.

During the hot, dry season of 1955 the pathogen isolated most frequently from dry beans [*Phaseolus vulgaris*] affected by root rot in S.W. Ontario was *F. oxysporum*, whereas in 1956, a cool, wet season, *F. solani* f. *phaseoli* predominated.

Club root [*Plasmodiophora brassicae*: **35**, p. 158] is spreading on Cruciferae in Canada. Carrots in market gardens in Ontario and Quebec were affected by

Cercospora carotae. A canker of parsnips (*Itersonilia perplexans*) [cf. **35**, p. 862] is reported for the first time from Canada in Peel county, Ontario.

Tomato anthracnose (*Colletotrichum phomoides*) [**35**, p. 155] is important in the canning crop in Ontario.

Following the use of organic fungicides against apple scab (*Venturia inaequalis*), the incidence of powdery mildew (*Podosphaera leucotricha*) [**36**, p. 193] has increased in Ontario. A new virus disease of apple, leaf pucker, was first found at Summerland, British Columbia, in 1954. Peaches in S.W. Ontario are affected by bacterial spot (*Xanthomonas pruni*) [**35**, p. 815]. Raspberry crops are increasingly attacked by anthracnose (*Elsinoe veneta*) [**35**, p. 420] and require a regular spray programme.

Among the diseases of trees and shrubs new records for Canada are *Fusicoccum abietinum* on *Abies balsamea* in New Brunswick and *Gymnosporangium bermudianum* on *Juniperus horizontalis* in Ontario; new for N. America is *Trochila ilicis* on *Ilex aquifolium* in British Columbia.

Cumminsia mirabilissima is now established on *Mahonia aquifolium* in Ontario [**35**, p. 876] and Quebec.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **6**, 2, p. 26, 1957.

LILY R. BROWN reports from Peru that *Colletotrichum graminicola* was isolated from leaf spots on lucerne grown at La Molina Experiment Station, Lima. *Helminthosporium sativum* [*Cochliobolus sativus*: map 322] and *Curvularia lunata* (a new fungus record for the country) were found on *Cynodon dactylon*. A fungus closely resembling *Phoma solanicola* [**33**, p. 314] was isolated from potato stems.

J. A. SPENCE states that in June 1957 *Xanthomonas albilineans* was recorded on sugarcane [map 33] in St. Lucia, British West Indies, var. B34104 being severely affected.

GRASSO (V.). **La ricerca scientifica in alcuni Istituti di patologia vegetale degli Stati Uniti d'America.** [Scientific research in some plant pathological institutes in the United States.]—*Ann. Sper. agr.*, N. S., **11**, 6, *Suppl.*, pp. XXVII-LX, 1957. [English summary.]

This is a reprint [**36**, p. 576].

Thirty-seventh Annual Report, Department of Agriculture, California, for the period ending 31 December, 1956. Bureaux of Plant Pathology and Plant Quarantine.—*Bull. Dep. Agric. Calif.*, **46**, 2, pp. 165–182, 1 fig.; 183–190, 1 fig., 1957.

In the report of the plant pathology section [cf. **36**, p. 8] the results of the annual disease surveys are given by C. W. NICHOLS, T. R. CARPENTER, and D. Y. ROSENBERG. Cherry buckskin disease (peach western X disease virus) was found on only 1 tree; a chestnut tree in San Joaquin was infected by *Endothia parasitica*. *Nectria galligena* on apple occurred in 5 orchards. Sweet potato internal cork [virus: **36**, p. 208] was identified in samples from 9 of 13 counties. Five more cotton plantings in the Imperial Valley were found infested by *Phymatotrichum omnivorum*. A virus-like disorder of Olallie blackberries caused proliferation of stunted shoots, a light yellow mosaic affecting extremely dwarfed leaves, upward curling of the margins, general yellowing of the foliage, and a 'crumbly' consistency of the fruit. In the 5 plantings inspected, covering approximately 51.5 acres, only one small field was free from infection.

R. L. McCLAIN & J. P. HILL found peach mosaic virus on 918 trees (only 1 outside the quarantined area) on 307 properties.

R. L. McCLAIN, G. F. SNOW, & J. P. HILL state that [citrus] tristeza virus infection [**37**, p. 41] occurred for the first time in oranges in the San Joaquin Valley, having been introduced with budwood from trees which, supported by tolerant rootstocks, showed no symptoms. These trees were said to have been planted 60 years before,

and to have been topworked with navel orange between their 20th and 25th year. No evidence of natural spread of tristeza has been found.

The presence of tristeza-infected Meyer lemons [36, p. 316] throughout the State was considered dangerous and the Director of Agriculture has been empowered to eradicate them from commercial citrus areas.

According to A. SCHLOCKER spread of peach yellow leaf roll virus [37, p. 172] to new locations within the affected counties has been relatively slow and the disease has remained stable since 1954; the total numbers of properties found infected in 1956 was 35.

C. G. WEIGLE, A. M. FRENCH, & T. C. FULLER report that club root of broccoli (*Plasmodiophora brassicae*) was found in Humboldt county, this being its first occurrence in the State outside the San Francisco Bay region. There was a severe outbreak of leaf gall (*Exobasidium vaccinii*) on azalea (*Rhododendron* spp.) at a large exhibition garden in Los Angeles county; bacterial blight (*Xanthomonas papavericola*) occurred on oriental poppy (*Papaver orientale*).

The plant quarantine section, presented by A. P. MESSENGER & E. A. BREECH, describes the organization of the Service.

Twenty-First Biennial Report, State Plant Board of Florida, 1954-56.—*Rep. Fla. Pl. Bd.*, 2 (*Bull.* 11A), 115 pp., 19 fig., 2 graphs, 1 map, 1957.

The ornamental pathology section (pp. 78-89) of this report [cf. 36, p. 808] states that the most serious disease of pompom chrysanthemum is root rot and wilt, a complex of *Pythium* spp., *Rhizoctonia* [*Corticium*] *solani*, *Fusarium oxysporum*, and nematode damage.

Wilt and trunk-rot of coconut and royal palms (*Roystonea regia*) begins with a greying and wilting of the lower leaves, gumming on the trunk, and vascular discoloration. The disease progresses rapidly, ending in collapse of the crown and breakdown of the stem tissue. A *Xanthomonas* sp. has been found associated.

M. COHEN reviews the work of the Citrus Pathology Department (pp. 90-102), some of which has been noticed [cf. 35, p. 781; 36, p. 585].

ALANDIA (S.) & BELL (F. H.). **Diseases of warm climate crops in Bolivia.**—*F.A.O. Pl. Prot. Bull.*, 5, 11, pp. 172-173, 1957.

In this paper [cf. 37, p. 8] it is stated that the most destructive disease of citrus in Bolivia is gummosis (*Phytophthora* sp.). In some citrus-growing areas a fruit and leaf spot caused by *Septoria* sp. often marks oranges and grapefruits badly, and in the eastern lowlands sweet orange scab (*Elsinoe australis*) [map 55] causes the same type of damage. Sour orange scab (*E. fawcetti*) [map 125] is common, and sooty mould (*Capnodium citri*), felt (*Septobasidium* sp.), and anthracnose (*Colletotrichum gloeosporioides*) [*Glomerella cingulata*] are widespread. [Citrus] exocortis [virus] is present on nursery trees grafted on trifoliate orange in the Sud Yungas of La Paz.

The most widely distributed of the major diseases of coffee is brown-eye leaf spot (*Cercospora coffeicola*) [*Glanerella cingulata*], but part of the damage attributed to it may be due to *Colletotrichum coffeanum*. American leaf spot (*Mycena citricolor*) [map 9] is locally abundant in various regions of high humidity, and *Pellicularia koleroga* may occur under similar conditions. *Mycosphaerella* sp. and *Septoria berkeleyi* were collected on coffee in the La Paz Yungas.

An avocado wilt was seen in various localities; *Phytophthora cinnamomi* [map 302] has been isolated from the roots of dying trees and is presumed to be the usual cause of the disease. Other fungi collected from avocado are *Cercospora purpurea* (leaf spot) and *Glomerella cingulata* (fruit rot).

Witches' broom (*Marasmius perniciosus*) appears to be present wherever cacao is grown.

The only disease of sugarcane of major importance is smut (*Ustilago scitaminea*) [map 79], which is confined to the Rio Chico region of the Department of Chuquisaca. *Leptosphaeria sacchari* and *Melanconium* [*Pleocyta*] *sacchari* [map 255] were collected in the Santa Cruz area. *Colletotrichum falcatum* [*Glomerella tucumanensis*] appears to be present, though no spores have been found.

False smut of rice (*Ustilaginoidea virens*) [cf. 33, p. 317] is found in Santa Cruz. *Cercospora cruenta* was collected on velvet bean [*Mucuna deeringiana*], and a mosaic was noted on the same host. *C. [Mycosphaerella] arachidicola* was found on ground-nut [map 166]. *Dothidella ulei* [34, p. 176] is important in northern Bolivia on *Hevea* rubber on which black crust (*Catacauma huberi*) [cf. 34, p. 545] is also common.

Papaw is widely attacked by *Asperisporium caricae* [cf. 34, p. 606]; *Cercospora henningsii* occurs on yuca [cassava]; *Pellicularia filamentosa* [*Corticium solani*] causes a leaf spot in small plantings of kenaf [*Hibiscus cannabinus*]; and *Colletotrichum camelliae* [*Glomerella cingulata*] was found on tea in the La Paz Yungas.

OKABE (N.) & GOTÔ (M.). **Bacterial plant diseases in Japan. I. A list of bacterial diseases and their pathogens. II. Studies on soft rots due to *Erwinia aroideae* (Townsend) Holland, with special reference to the antigenic structures of flagella. III. Studies on bacterial rot diseases due to the organisms of *Pseudomonas*. IV. Studies on bacterial shoot blight of Tea Plant caused by *Pseudomonas theae* n.sp. V. (by N. OKABE). A study of loquat bacteriosis, canker, and bud blight caused by *Pseudomonas eriobotryae*. VI. Bacterial black spot of cruciferous plants. VII. Soft rot diseases of *Chrysanthemum* and Shasta Daisy caused by *E. carotovora*. VIII. A bacterial gall of the Japanese Wistaria.—*Rep. Fac. Agric. Shizuoka Univ.* 5, pp. 63–71, 72–86, 87–95, 96–99, 100–106, 1955; *Bull. Fac. Agric. Shizuoka Univ.* 6, pp. 5–8, 9–13, 14–15, 1956. [Japanese. Abs. from English summaries. Received 1957.]**

The 76 bacterial plant pathogens found in Japan are listed together with the diseases caused by each and reference to the investigator and year of publication; 15 of these diseases are considered to require further investigation. Several physiologic strains were distinguished among isolates of *E. aroideae* from rotted Chinese cabbage and carrot. Both flagellate and non-flagellate forms were obtained from natural infections. In inoculation experiments isolates from both hosts induced soft rot of peach, pear, orange, and maize leaves. A study was also made of the antigenic structures of the flagella [37, p. 138], which could be used as a basis for investigations on host-parasite relationships, epidemiology, and geographical distribution of strains.

In comparative studies on the pathogenic, physiological, and cultural characters of *Pseudomonas* spp. from the Shizuoka Prefecture isolates of *P. destructans* (supposed to be a weakened strain of *P. marginalis*) from onion and one of *P. syringae* from Chinese cabbage were shown to have a limited host range. Isolates with a wider host range were *P. marginalis* [36, p. 293] from sunflower, Chinese cabbage, and potato, and *P. syringae* from a root rot of dahlia and a leaf spot of clover, which was able to produce symptoms similar to *Xanthomonas pruni* when inoculated to peach leaves.

During the first harvesting season when the weather is favourable tea plants in Shizuoka Prefecture are affected by a bacterial shoot blight. The first symptoms are small, water-soaked, brown spots which increase rapidly during wet weather and girdle the stem, causing the shoot to turn black and die. This disease has previously been ascribed to *Bacillus theae* [3, p. 4] but the authors consider the causal organism to be a *Pseudomonas* and have renamed it *P. theae* (Hori & Bokura) Okabe & Goto.

From bacterial canker and bud blight lesions of loquat (*Eryobotrya japonica*) in

Japan [33, p. 613], previously ascribed to 2 distinct organisms, 3 strains were isolated in Nagasaki and Shizuoka Prefectures which are considered to belong to *P. eriobotryae*. The canker was reproduced by inoculation. Following a comparative study of 30 isolates of *P. maculicola* from radish, Chinese cabbage, and turnip in the Iwata district it is concluded that there are a number of strains varying in pathogenicity and host specificity, but that the differences are not sufficient to separate as var. *japonicum* those attacking Chinese cabbage and turnip. Symptoms of soft rot of *Chrysanthemum morifolium* and Shasta daisy (*C. maximum*) are first evident as water-soaked, brownish lesions at, or below, soil level. The tissues become rotted and the stem falls over. The causal organism is believed to be a strain of *E. carotovora*, similar to *E. chrysanthemi* in the United States [35, p. 189].

The pathogen causing bacterial gall of *Wisteria floribunda* (*E. milletiae*) has two strains, one fermenting lactose and the other not.

CROSSAN (D. F.) & LYNCH (D. L.). **A chromatographic analysis of the exudate of *Xanthomonas vesicatoria*.**—*Phytopathology*, 47, 11, p. 690, 1957.

Investigations at the University of Delaware, Newark, of the exudate of *X. vesicatoria* [cf. 36, p. 520] indicated the presence of the following sugars, in order of relative abundance: galactose, glucose, xylose, rhamnose, and a methylated sugar with a similar R_f value to that of 2,3,4,6-tetramethyl- α -glucose. A uronic acid with a similar R_f value to glucuronic acid was also present.

MACLEOD (D. M.). **A fungous enemy of the Pea aphid, *Macrosiphum pisi* (Kaltenbach).**—*Canad. Ent.*, 87, 11, pp. 503–505, 6 fig., 1955. [Abs. in *Rev. appl. Ent.*, Ser. A, 45, pp. 403–404, 1957.]

Empusa aphidis was responsible for heavy mortality of *M. pisi* [*Acyrtosiphon pisum*] on peas in the Annapolis Valley, Nova Scotia, in 1947. *M. solanifolii* [*M. euphorbiae*] was also susceptible.

PICCARDO (G.). **Fungifughi e fungicidi.** [Fungifuges and fungicides.]—*Ital. agric.*, 94, 7, pp. 595–601, 1957.

This review includes sections on copper, mercury, organic, and systemic fungicides, and antibiotics.

CASARINI (B.) & PUCCI (E.). **Specificità d'azione degli anticrittogamici.** [Specificity of action of fungicides.]—*R. C. Accad. Lincei*, 21, 5, pp. 305–308, 1 graph, 1956.

At the Istituto di Patologia Vegetale, University of Bologna, the LD 50 values in p.p.m. were determined for Caffaro powder, zineb, pomasol, 1,3,5-triazine, captan, and verdasan *in vitro* with *Alternaria oleracea* [*A. brassicicola*], *Macrosporium* [*Stemphylium*] *sarciniforme*, *Sclerotinia fructigena*, *Cercospora beticola*, *Fusicladium dendriticum* [*Venturia inaequalis*], and *Plasmopara viticola*.

Caffaro powder was effective against all except *V. inaequalis*. Zineb exerted a strong inhibitory action on *P. viticola*, *V. inaequalis*, and *S. sarciniforme*, and captan on *P. viticola*, *V. inaequalis*, and *S. fructigena* at 0.8, 1.2, and <2 p.p.m., respectively. Pomasol was most effective against *S. fructigena* (3.3), followed by *V. inaequalis* (4.7), *P. viticola* (5.1), and *C. beticola* (6.1). Verdasan inhibited the growth of *S. sarciniforme*, *C. beticola*, and *V. inaequalis* at <2 p.p.m., of *A. brassicicola* at 2.8, and of *S. fructigena* at 5.7. Triazine was highly toxic to all the species tested except *P. viticola*, suppressing *S. sarciniforme* at 1.6 p.p.m., *V. inaequalis* at 1.3, and *C. beticola*, *S. fructigena*, and *A. brassicicola* at <2.

TOPPS (J. H.) & WAIN (R. L.). **Investigations on fungicides. III. The fungitoxicity of 3- and 5-alkyl-salicylanilides and para-chloroanilides.**—*Ann. appl. Biol.*, 45, 3, pp. 506–511, 1957.

At Wye College, University of London, it was shown that the chloroanilide

derivatives generally retarded mycelial growth less than the corresponding anilides. Introduction of an alkyl grouping tended to reduce the fungistatic effect more than the *n*-propyl derivatives. Salicylanilide gave the greatest over-all inhibition of the test fungi (*Pythium ultimum*, *Monilia* [*Sclerotinia*] *fructigena*, *Verticillium albo-atrum*, *Alternaria solani*, *Aspergillus niger*, and *Botrytis cinerea*).

PIANKA (M.) & HALL (J. C.). **Studies in fungitoxicity. 1. Fungitoxicity of certain carbocyanines.**—*J. Sci. Fd Agric.*, **7**, pp. 432–437, 1957.

Several of the 35 carbocyanines tested against spores of *Venturia inaequalis*, *Botrytis cinerea*, and *Fusarium bulbigenum* var. *lycopersici* by the Murphy Chemical Co., Wheathamstead, Herts., were found to be active, especially those of a fairly low molecular weight. Fungitoxicity was dependent on the heterocyclic base or bases from which the carbocyanine was derived.

BROOK (M.) & CHESTERS (C. G. C.). **The growth of *Botrytis cinerea* Pers., *Fusarium caeruleum* (Lib.) Sacc., and *Phoma foveata* Foister in the presence of tetrachloronitrobenzene isomers.**—*Ann. appl. Biol.*, **45**, 3, pp. 498–505, 1957.

At the University of Nottingham the linear growth of *B. cinerea*, *F. caeruleum*, and *P. foveata* was reduced by the vapour from any of the three isomers of tetrachloronitrobenzene [cf. **36**, p. 603], the 2:3:4:6-isomer being the most active against all three fungi; tecnazene was more active than the 2:3:4:5 against *B. cinerea*, but less active against *F. caeruleum* and *P. foveata*. Two strains of *F. caeruleum* resistant to tecnazene were not so to the other 2 isomers, though more resistant than their sensitive parent strains. Sporulation and sclerotial production by *B. cinerea* were completely suppressed by tecnazene and the 2:3:4:6-isomer, but not by the 2:3:4:5-isomer. So far, only tecnazene has been used commercially; the evidence suggests that against *F. [caeruleum]* dry rot of potato the other isomers might be more active.

TAMURA (H.). **Evaluation of fungicidal effect of organic fungicides. III. Fungitoxicity of dinitro (1-methyl heptyl) phenyl crotonate, and the effect of temperature and pH on it.**—*Bull. nat. Inst. agric. Sci.*, Tokyo, Ser. C, 7, pp. 105–111, 4 graphs, 1957. [Japanese. Abs. from English summary.]

The results reported in this further contribution [cf. **35**, p. 835] of *in vitro* experiments on the toxicity of dinitro (1-methyl heptyl) phenyl crotonate to spores of *Piricularia oryzae* and *Ophiobolus* [*Cochliobolus*] *miyabeanus* indicated that the fungicide would be of no practical use in controlling these fungi on rice in the field.

VIRTANEN (A. I.), HIETALA (P. K.), & WAHLROOS (Ö.). **Antimicrobial substances in cereals and fodder plants.**—*Arch Biochem.*, **69**, pp. 486–500, 2 fig., 2 graphs, 1957.

The structure of the anti-fungal factor isolated from young wheat and maize plants at the Biochemical Institute, Helsinki, Finland, has now been established as 6-methoxy-2(3)-benzoxazolinone [**36**, p. 234].

The anti-fungal factor in red clover was purified and found to be an aromatic phenol, containing no nitrogen, with a mol. wt. of about 300. The chlorogenic acid content of *Aquila* potato leaves was shown to be sufficiently high to inhibit the development of *Phytophthora infestans* in that variety [see below and cf. **34**, p. 811; **35**, p. 881].

VALLE (E.). **On anti-fungal factors in Potato leaves.**—*Acta chem. scand.*, **11**, 2, pp. 395–397, 1 graph, 1957.

At the Biochemical Institute, Helsinki, Finland, a highly active anti-fungal extract was obtained by macerating the leaves of field grown *Aquila* potato plants resistant

to *Phytophthora infestans* [see above] in 96% ethanol for 5 min. The ethanol residue from 0.5 g. of fresh leaf material in 1 ml. of synthetic medium totally inhibited the mycelial growth of *Fusarium nivale* [*Calonectria nivalis*]. On pea agar the inhibition limit against the same fungus was 0.7 g./ml. and against *P. infestans* 1 g./ml. An anti-fungal effect was also noted in the Sieglinde variety, which is very susceptible to *P. infestans*, but the inhibition limits were much higher.

KÖNIGER (M.) & OBERMAYER (G.). **Verbesserter Nachweis kupferhaltiger Spritzbeläge auf Pflanzen.** [Improved demonstration of copper spray residues on plants.]—*NachrBl. dtsh. PflSchDienst (Braunschweig), Stuttgart*, **9**, 11, pp. 171–172, 2 fig., 1957.

From the Pflanzenschutzlaboratorium der Wacker-Chemie, Munich, the authors describe an improvement of their method [31, p. 501] for demonstration of copper residues [37, p. 74]. Smooth filter papers were dipped in a 0.5% sol. of a rubeanic compound (a dithio-oxalic acid diamide) in ethyl alcohol, freed from drops, and allowed to dry in a horizontal position. When an impression is to be taken the leaf is placed on a sheet of glass and covered first by a filter paper steeped in 20% acetic acid, then one of the impregnated ones, and pressed down with a cotton wool pad. Cu dissolved by the acetic acid combines with the dithio compound to form an insoluble greyish-green precipitate in the lower filter paper, which may be dried and kept as a permanent record.

For cuprous oxide residues 3% H_2O_2 is added to the acetic acid (20:80) to act as an oxidizing agent.

This method lends itself to use in the field.

KRENTOS (V. D.), BATT (R. F.), & MARTIN (J. T.). **Spray application problems: XXXI. The determination of sulphur deposits on foliage.**—*Rep. agric. hort. Res. Sta. Bristol*, 1956, pp. 122–124, [1957].

The method described, which permits the estimation of sulphur spray deposits on leaf disks over the range 0–25 μ g., has been successfully used to follow the distribution of lime-sulphur on apple foliage.

DAVIDSON (J. H.). **Rapid vaporization of methyl bromide in treatment of seedbeds, for turf renovation and other uses.**—*Down to Earth*, **13**, 2, pp. 6–9, 5 fig., 1957.

By the new method here described methyl bromide is vaporized by passage through a portable hot water bath and applied to the soil as a gas beneath a gas-tight cover. Excellent results are claimed for weed and pest control; efficiency against soil-borne diseases is yet to be determined.

WIRTH (A.). **Maschinen, Geräte und Einrichtungen für die Schädlingsbekämpfung.** [Machines, apparatus, and equipment for pest control.]—*Schweiz. Z. Obst- u. Weinb.*, **66**, 24, pp. 553–567, 14 fig., 1957.

A number of spraying machines, ranging from equipment for the small farmer to large and complex machines suitable for agricultural co-operatives and contractors are described.

KOCH (H.). **Anerkannte Pflanzenschutzgeräte und -geräteeile.** [Approved plant protection equipment and component parts.]—*NachrBl. dtsh. PflSchDienst (Braunschweig), Stuttgart*, **9**, 10, pp. 145–151, 7 fig., 5 graphs, 1957.

Specifications and performance data of several approved spraying and dusting machines are presented.

RAO (D. S.). **Insecticidal property of the fungus *Ganoderma lucidum* attacking Palms.**—*Curr. Sci.*, **26**, 10, pp. 325–326, 1957.

Experiments at the Dept of Agriculture, Bangalore, with kerosene oil extracts of

the sporophore of *G. lucidum*, showed that the 2.75–11% extracts had greater insecticidal strength on grain than kerosene alone, and compared well with pyrethrum.

TEMPEL (A.). **Serological studies on *Fusarium oxysporum* Schl. emend. Sn. et H.**—*Nature, Lond.*, **180**, 4600, p. 1483, 1 fig., 1957.

Rabbit antisera prepared from culture liquids of single-spore strains of *F. oxysporum* f. *lupini* and f. *pisi* were tested against antigens of the 2 isolates (in agar) at the Laboratorium voor Phytopathologie, Wageningen. Definite precipitation patterns were obtained, and one antiserum did not inhibit the reactions of the other.

BAKER (K. F.). (Edit.). **The U.C. system for producing healthy container-grown plants.**—*Manual Calif. agric. Exp. Sta.* 23, 332 pp., 110 fig., 12 diag., 14 graphs, 1957. \$1.

This manual comprises 17 papers describing in popular terms the system elaborated by the University of California Division of Agricultural Sciences for converting old nurseries or establishing new ones in order to produce healthy container-grown plants through the use of clean soil and clean stock [cf. **36**, p. 646], with background information and reference data for the grower.

ROSA (M.). **Contributo ad una bibliografia fitopatologica italiana per l'anno 1956.** [Contribution to an Italian phytopathological bibliography for the year 1956.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **14** (1956), 2, pp. 367–383, 1957.

A reference list of titles of 366 works of phytopathological interest published in Italian in 1956.

RINGEL (S. M.) & BENEKE (E. S.). **The inactivation of pyridinethione, an antifungal agent, by glucose.**—*Mycologia*, **49**, 5, pp. 636–643, 2 graphs, 1957.

An evaluation (at Michigan State University, East Lansing) of the effects of D-glucose on the antifungal activity of the sodium salt of 1-hydroxy-2(1H)-pyridinethione [**36**, p. 187] (against *Colletotrichum phomoides*) showed that it increased with concentration and time. Spectrophotometric and bioassay methods were used.

CHASTUKHIN (V. Y.), GONCHAROVA (Mme L. A.), & GOLUBCHINA (Mme R. N.). **Массовые культуры мицелиальных грибов для получения кормовых белков.** [Mass cultures of mycelial fungi for producing fodder proteins.]—Микробиология [*Microbiology*], **26**, 3, pp. 360–366, 2 graphs, 1957. [English summary.]

At the Leningrad Technological Institute for Food Production the cultivation of 23 hyphomycetes on waste from treacle production plants revealed that the large amounts of mycelium obtained could be used for the production of fodder proteins. Experiments on cereal waste with 2 *Penicillium* species and *Fusarium roseum* are still in progress.

GALLOWAY (L. D.) & BARTON-WRIGHT (E. C.). **Microorganisms produce complex substances. (I), (II), (III), (IV).**—*Chem. Prod.*, **19**, pp. 349–351, 5 fig., pp. 404–406, 453–455, 484–485, 491, 1956. [Received 1957.]

These articles review in popular terms recent developments in the use of bacteria and fungi to synthesize complex organic substances including citric acid, cortisone, protein from beet molasses (by *Candida utilis*), fats, amylase, ergosterol (from *Aspergillus sydowi*), riboflavin, and cyanocobalamin (vitamin B₁₂) (from the mycelial residues of *Streptomyces* used for antibiotic production).

PETTINARI (CARLA M.). **Un ceppo di *Paecilomyces varioti* Bain. osservato su legno e stoffa.** [A strain of *Paecilomyces varioti* Bain. observed on wood and fabric.]

—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **14** (1956), 2, pp. 333–345, 6 fig., 1957.
[English summary. 45 refs.]

From a rotting piece of damask and an adjacent wooden bracket the author isolated *Paecilomyces varioti* [*Byssosclamyces fulva*] which is stated to be not previously recorded in Italy [cf. **35**, p. 702, *et passim*].

BUBERNAK (J.) & BASKIN (A. D.). **Electroanalysis with controlled cathode potential of metallic copper applied to fabrics as metallo-organic fungicides.**—*Text. Res. J.*, **27**, 11, pp. 878–882, 1 diag., 1957.

A method is presented from the U.S. Army Quartermaster Research and Development Center, Natick, Massachusetts, for the electrolytic determination of Cu in fabrics (cotton duck in these tests) treated with organo-copper fungicides, represented by copper-8-quinolinolate, copper naphthenate, and a mixture of both. The samples contained fire-retardants as metallic oxides, including those of Sb, Ca, Zn, and Fe; Sb caused the greatest interference with the determination of Cu, which was eliminated, however, by depositing the Cu from ammonium tartrate solution with control of the cathode potential, using a laboratory potentiometer to measure the voltage. Data are furnished showing that Cu may be electroplated from ammonium tartrate solutions containing a 6-fold higher conc. of Sb with a cathode potential of -0.6 volts. Standard deviations for analyses of these solutions were ± 0.001 mg. Cu./ml.

Preparation of samples for electroanalysis was readily effected by oxidizing a major part with sulphuric acid alone and completing the action by addition of perchloric acid to the hot solution drop by drop.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **6**, 1, pp. 13–15, 1957.

Details (covering general regulations, certification and import licences, imports prohibited, and imports restricted) are given of quarantine regulations for the importation of plant products into the U.S.S.R., issued on 9 Jan. 1956 by the State Directorate for Quarantine and Plant Protection of the Ministry of Agriculture.

LITTMAN (M. L.). **An improved method for detection of urea hydrolysis by fungi.**—*J. infect. Dis.*, **101**, 1, pp. 51–61, 1957.

Of 105 strains of filamentous moulds and actinomycetes grown at the Mount Sinai Hospital, New York, on a medium consisting of 1% urea, 0.1% thiotone, 0.5% dextrose, 0.5% NaCl, 0.3% anhydrous KH_2PO_4 , 0.3% anhydrous Na_2HPO_4 , 1.5% agar, and 0.012 g./l. phenol red at pH 7, only *Botrytis cinerea* and *Dactylium dendroides* [*Hypomyces rosellus*] failed to hydrolyse urea. On the other hand, only 22 of 55 species of yeasts proved capable of doing so.

TANDON (R. N.) & BILGRAMI (K. S.). **Assimilation of disaccharides by some fungi causing 'leaf spot' diseases.**—*Proc. Indian Acad. Sci.*, Sect. B, **46**, 4, pp. 274–284, 1957. [18 refs.]

At the Dept of Botany, University of Allahabad, *Phyllosticta cycadina* [**34**, p. 724], *P. artocarpina*, and *Pestalotia mangiferae* [**35**, p. 378] were cultured in Asthana and Hawker's Medium A, in which the glucose was replaced by sucrose, maltose, and lactose or by the monosaccharides resulting from their hydrolysis. Utilization was followed by paper chromatographic study of filtrates from 1- to 16-day-old cultures and growth comparisons were based on mycelial mat weight.

Sucrose was hydrolysed before assimilation and gave essentially the same growth as its constituent monosaccharides. *P. mangiferae* utilized glucose and fructose simultaneously, but the *Phyllosticta* spp. utilized the glucose first. Maltose was also hydrolysed before assimilation, maltotriose being formed in the medium; it gave

better growth than glucose. Lactose was assimilated without hydrolysis but resultant growth was greatly inferior compared with glucose and galactose.

BUSHNELL (W. R.). **Acidic metabolic products of *Polyporus sulphureus*.**—*Mycologia*, **49**, 5, pp. 623–635, 9 graphs, 1957.

A cultural study at the University of Wisconsin, Madison, indicated that *P. sulphureus* produced 9 acids, chiefly oxalic and acetic.

VENKATA RAM (C. S.). **Studies in the amino acid composition of *Fusarium mycelium*.**—*Proc. nat. Inst. Sci. India*, Ser. B, **22**, 5, pp. 227–235, 1 pl., 2 fig., 1956.

In paper chromatographic studies at the University Botany Laboratory, Madras, the free amino acid content of 22 species of *Fusarium* [37, p. 23] from 9 taxonomic groups was not correlated with their taxonomic positions. Both free and bound alanine was found in all the species. The production of fusaric acid [36, p. 778] appeared to bear little relationship to amino acid synthesis, which was dependent on the carbon source.

NATARAJAN (S.). **Carbon nitrogen metabolism of soil fungi. III.**—*J. Madras Univ.*, **26**, B, 3, pp. 629–638, 18 graphs, 1956.

Continuing his work with *Fusarium udum* and *F. vasinfectum* [36, p. 417], the author noted that where the sole N source was ammonium nitrate the initial pH remained steady for the first 4 days, irrespective of glucose concentration. As with sucrose, the ammonium N level dropped initially but afterwards remained apparently constant for a given sucrose level: glucose depletion and N accumulation were exponential. At a particular glucose level there were specific N concentrations for maximum fungal activity.

JINKS (J. L.). **Naturally occurring cytoplasmic changes in fungi.**—*C.R. Lab. Carlsberg*, (Sér. Physiol.), **26**, 12, pp. 183–203, 1956. [Received 1957.]

In further studies at the Dept of Genetics, University of Birmingham, of cytoplasmic differences between sub-lines of single homokaryon colonies arising without selection [cf. 33, p. 682], an essential part of the work was the separation of the phenotypic changes that occurred into those arising from nuclear mutation and those induced by cytoplasmic changes. The method of separation depended on the exchange of nucleus and cytoplasm between different phenotypes, utilizing the natural properties of heterokaryons. All the changes in phenotype reported were proved to be cytoplasmic in origin. The widest variation occurred in colonies from single hyphal tips, those from asexual spores gave rather less, and sexual spores produced uniform colonies with the entire potential characteristic of the line. The meiotic division is concluded to be the source of cytoplasmic uniformity. A more or less complete and fully integrated cytoplasm is essential for the successful differentiation of the sexual apparatus.

GUILLEMAT (J.) & MONTÉGUT (J.). **Deuxième contribution à l'étude de la microflore fongique des sols cultivés.** [Second contribution to the study of the fungus microflora of cultivated soils.]—*Ann. Épiphyt.*, **8**, 2, pp. 185–207, 5 graphs, 1957.

Continuing their investigations [36, p. 423], the authors found that digging cultivated soil disturbs, but only for a short time, the relative frequency of the different fungal species present. There was a definite break in continuity between the surface microflora and that of the soil itself. In spite of a wide difference between plots in the nature, quality, and quantity of plant debris applied, the cultivation of wheat, especially in a 2-year rotation with beet, induced homogenisation of the soil microflora. Plots receiving stable-manure were richer in surface microflora than those given NPK or no treatment.

The effect of weather was more distinct and more rapid than that of nutritional and cultural factors, humidity having a stronger influence than temp. The first cold spells reduced the numbers of fungal colonies (especially of *Penicillium* spp.) in the upper layers of the soil, and a period of severe cold greatly reduced fungal activity which was resumed abruptly with the return of higher temp.

P. lilacinum [loc. cit.] used mineral rather than organic substrates; *P. canescens*, on the other hand, required organic matter and probably plays an important part in the formation of humus.

POMINI (L.) & TIBALDESCHI (C.). **Micologia pedemontana.** [Piedmontese mycology.]—*Coll. cult. sci. Ist. tec. agr. Vercelli*, 5 (1956), 97 pp., 82 fig., 1957.

This is a descriptive list of the larger fungi (Agaricaceae, Polyporaceae, and Ascomycetes) found in Piedmont, with notes and keys.

RAMAKRISHNAN (T. S.). **Notes on some fungi from South India. VI.**—*Proc. Indian Acad. Sci.*, Sect. B, 46, 3, pp. 149–154, 2 fig., 1957.

This contribution to the series [35, p. 397] includes *Pellicularia filamentosa* [*Corticium solani*] on the leaves, stem, and spikes of pepper (*Piper nigrum*), *Cercospora carbonacea* and *C. dioscoreae* on yam (*Dioscorea alata*), and one new species.

KUPREVICH (V. F.) & TRANZSCHEL (V. G.). Флора споровых растений СССР. IV. Грибы (1). Ржавчинные грибы. Вып. 1. Мелампсоровые. [Flora of sporing plants in U.S.S.R. IV. Fungi (1). Rust fungi. fasc. 1. Melampsoraceae.]—420 pp., 8 pl., 173 fig., 1 map, USSR Academy of Science, Moscow and Leningrad, 1957. [75 pp. refs.]. Roubles 29.65.

A detailed historical review of studies on the Uredinales from the middle of the 17th century to the present day, particularly those in U.S.S.R., is followed by sections on morphology, systematics, biology, a key to the 50 genera known in U.S.S.R. [19, p. 167], host relationships, and geographical distribution. Then follows (pp. 167–396) a detailed treatment of the family under study with keys to the genera and species. Some species not yet found in U.S.S.R. are included.

Melampsora lini on flax is considered by the authors as a complex species which they divide into *M. lini-usitatissimi* comb. nov., with f. *liniperda* on flax and 2 other f. spp., and *M. lini-cathartici* comb. nov. on *Linum catharticum* with 2 f. spp.

KERN (H.). **Untersuchungen über die Umgrenzung der Arten in der Ascomycetengattung Leucostoma.** [Studies on the delimitation of species in the ascomycete genus *Leucostoma*.]—*Phytopath. Z.*, 30, 2, pp. 149–180, 6 fig., 5 graphs, 1957. [English summary. 47 refs.]

Studies already noticed [34, p. 820; 35, p. 723] have been continued and amplified at the Institut für Spezielle Botanik der Eidg. Technischen Hochschule, Zürich, but no firm basis for specific delimitation within the genus has yet been established. Attention is drawn to the difficulties arising, *inter alia*, from the marked differences in pathogenicity of related strains, e.g., of *L. [Valsa] nivea* from poplar and *V. persoonii*, *V. cincta*, and *V. massariana* from Rosaceae; to the paucity of perithecia on inoculated hosts and in pure culture; and to cultural variations in colour, growth rate, temperature range, nutritional requirements, and toxin production.

LOEFFLER (W.). **Untersuchungen über die Ascomycetengattung Dothidea Fr.** [Studies on the ascomycete genus *Dothidea* Fr.]—*Phytopath. Z.*, 30, 4, pp. 349–386, 7 fig., 1957.

Following a discussion of the history and taxonomy of the genus, the author accepts *Dothidia* as the type genus of the Dothidiaceae (with *Plowrightia* and *Systremma* as synonyms) in the Pseudosphaeriales. Eight species are recognized

and described in detail with synonymy, hosts, distribution, cultural characters, and temperature relationships. There is one new species, *D. muelleri*, on dead branches of *Daphne striata*.

RAPER (K. B.). **Nomenclature in *Aspergillus* and *Penicillium*.**—*Mycologia*, **49**, 5, pp. 644–662, 4 fig., 1957. [50 refs.]

The author presents and discusses evidence indicating that conservation of the names *Aspergillus* and *Penicillium* for species with a perfect state would stabilize nomenclature and leave together the names of fungi that are not separated in nature.

CASTRONOVO (A.). **Producción de zoosporos binucleados por *Phytophthora infestans*.** [Production of binucleate zoospores by *Phytophthora infestans*.]—*Rev. argent. Agron.*, **22**, 4, pp. 177–183, 1955. [Received 1957.]

At the Dept of Plant Pathology, University of Minnesota, the author observed binucleate zoospores both within dehiscent sporangia of *P. infestans* (race 0) and after liberation. They germinated normally, both nuclei entering the germ tube. Such zoospores might be heterokaryotic, in which case cultures established from single zoospores might give rise to variations [cf. **34**, p. 392; **37**, p. 53].

GATTANI (M. L.). **Production of sclerotic granules by *Streptomyces* sp.**—*Nature, Lond.*, **180**, 4597, pp. 1293–1294, 1957.

At the Science Service Laboratory, Lethbridge, Alberta, a strain of *S. griseus* isolated from local soil produced abundant sclerotic granules on trypticase soy agar. Morphologically distinct granules were produced by *S. griseus* strain A.T.C.C. No. 10137 on the same medium, but no granules were produced by *S. antibioticus*, *S. lavendulae*, *S. scabies*, or *S. venezuelae*. Thus, it would appear that there is no justification for the erection of the genus *Chainia* [**35**, p. 212], separable from *Streptomyces* on the basis of the production of these structures.

KOPETZ (A. A.), TROY (V. S.), & MCCALLUM (M. R.). **Modified slide preparation for the official Howard mold count method.**—*J. Ass. off. agric. Chem. Wash.*, **40**, 3, pp. 905–908, 1957.

The performance of the Howard slide technique [**35**, p. 873] is improved, inclusion of air bubbles avoided, and even distribution of insoluble solids ensured by substituting careful manipulation of the cover slip (which should be square) for the usual official pre-spreading technique.

PAL (N. L.) & GOPALACHARI (N. C.). **Use of household refrigerator as a constant cold temperature bath.**—*Sci. & Cult.*, **23**, 4, p. 202, 1957.

At the Central Tobacco Research Institute, Rajahmundry, a constant temperature bath for seed germination tests was successfully set up in a household refrigerator, a large glass trough filled with water being allowed to cool without disturbance for 2–3 days, when a constant temperature ($\pm 1^\circ\text{C}$.) was attained, though the air temperature inside the refrigerator varied as much as 5–10°. Adjustment of the rheostat gave a range from 5.6–25°.

THUNG (T. H.). **Het virologisch onderzoek aan de Landbouwhogeschool, Wageningen.** [Virological studies at the Agricultural College, Wageningen.]—*Tijdschr. PlZiekt.*, **63**, 5, pp. 209–221, 6 fig., 1957. [English summary. 32 refs.]

In connexion with the installation on 1 Jan. 1957 of a Chair of Virology at the Agricultural University of Wageningen, the author traces important developments in the study of plant viruses in the Netherlands and then discusses various aspects of modern research on which studies are planned. They include the structure of

plant viruses, the sequence of events from the inception of infection to the production of completed particles, and insect transmission.

BOS (L.). **Plant teratology and plant pathology.**—*Tijdschr. PlZiekt.*, **63**, 5, pp. 222–231, 2 fig., 1957. [Dutch summary. 24 refs.]

The relationship between teratological and phytopathological phenomena is discussed, with special reference to witches' broom viruses [36, p. 635]. The substitution of the term 'pathological morphology' (or 'patho-morphology') for teratology is suggested as conveying a better idea of the significance of malformations in plant pathology.

HART (R. G.) & PEREZ-MENDEZ (GLADYS E.). **A simple nonparametric method for evaluating the results of half-leaf local-lesion assays.**—*Virology*, **4**, 1, pp. 130–134, 1957.

An account is given of the authors' method for assaying plant viruses, used at the Virus Laboratory, University of California, with a typical set of assay data [cf. 28, p. 346].

HIRAI (T.). **The diagnosis of plant virus diseases by means of paper electrophoresis.**—*Forsch. PflKr.*, Kyoto, **6**, 2, pp. 87–96, 5 fig., 17 graphs, 1956. [Japanese. Abs. from English summary. Received 1957.]

The application of Gray's electrophoretic technique [32, p. 232] to the investigation of a number of crude plant virus preparations at Nagoya University, Anzjo, Japan, disclosed that proteins from virus-infected plants move less readily than those from healthy ones on the filter paper; the latter move toward the cathode, the former toward the anode, and the patterns differ.

HIRATA (S.). **Studies on the 'colloidal precipitation method' for diagnosing virus-diseased Potato, Radish, Turnip, and Sweet Potato.**—*Mém. Fac. Agric. Miyazaki Univ.*, **1**, 1, pp. 137–177, 2 pl., 1955. [Received 1957.]

In further studies on the precipitation of expressed sap from virus-infected plants [35, p. 812] 1.5–2.5 ml. refiltered sap from the roots of mosaic-infected radish were mixed with 2 ml. 30% alcohol; precipitation occurred in 3 hr., whereas with sap from a healthy radish there was no reaction after 10 hr. The use of 30% ether or HgCl_2 did not give such good results, nor did sap from radish leaf blades. The best reaction was obtained by diluting the sap 2–4 times and testing at 20–25° C.

With potato tubers the best indication of virus infection (crinkle or leaf roll type of symptom) was obtained by mixing 1 ml. of undiluted sap with 1 ml. 0.1% HgCl_2 and observing the precipitation after 1 hr. at 20°. Tubers which had been stored for long periods were not so suitable as those freshly harvested. The accuracy of this method was 90% compared with 83% for the copper sulphate method [35, p. 273] or the methylene blue reaction.

In the opinion of the author the difference between diseased and healthy potato tubers revealed by the HgCl_2 -precipitation test is due to the difference in protein content, and that between diseased and healthy radishes in the alcohol-precipitation test is due to this feature and also to the different pH and isoelectric point.

MARXER (A.), MONDINO (A.), OLIVETTI (S.), & SEGRE (G.). **Relations entre le virus végétal et animal dépistées par la réaction de précipitation.** [Relations between plant and animal virus revealed by the precipitation reaction.]—*Naturwissenschaften*, **44**, 14, pp. 407–408, 1957.

Following an earlier note (*Naturwissenschaften*, **43**, p. 282, 1956) in which Marxer reported immunization of cattle against foot and mouth disease by the use of a vaccine prepared from tobacco mosaic virus, the present paper records positive

precipitin reactions between calf tobacco mosaic virus antiserum and guinea pig hyperimmune foot and mouth virus antiserum.

Also recorded is a positive precipitin reaction between tobacco mosaic virus and serum obtained from a fowl infected with pseudopest [Newcastle disease] virus.

SILBERSCHMIDT (K.), FLORES (E.), & TOMMASI (L. R.). **Further studies on the experimental transmission of 'infectious chlorosis' of Malvaceae.**—*Phytopath. Z.*, **30**, 4, pp. 387–414, 5 fig., 1957.

In a few carefully observed cases the authors were able to transmit the virus of infectious chlorosis of Malvaceae [*Abutilon* variegation virus: **36**, p. 87] directly from *Abutilon thompsonii* to healthy *Sida rhombifolia* plants, using the insect vector *Bemisia tabaci*. Transmission was successful in a much higher percentage of cases when the virus from *A. thompsonii* was first transmitted by grafting to *S. rhombifolia* and then by vector. Transmission from *S. rhombifolia*, which had been infected by insects, to healthy plants by *B. tabaci* was easy. *B. tabaci* from *Aleurites* is capable of transmitting the virus if acquired from an acceptable experimentally infected source. The chlorotic spots on *Abutilon thompsonii* are to be regarded as symptoms of a virus disease. The virus on *S. rhombifolia* and that on *A. thompsonii* may be considered as 2 closely related strains of the same virus. The authors succeeded in transmitting the virus from various Malvaceae to healthy *Malope trifida* plants by insects and grafting. The symptoms produced differed considerably from those on most of the malvaceous spp. investigated.

A number of new experimental hosts of the virus are noted, including *Anoda wrightii*, *Lavatera cachemiriana*, and *Malva hispanica*. With some of these (e.g., *A. wrightii* and *L. cretica*) transmission was by insects and grafting, but with *L. arborea* it was successful only by the vector, and with *Abutilon mauritianum* by grafting.

SCHMELZER (K.). **Versuche zur Übertragung des Tomatenasperme-Virus mit Cuscuta-Arten.** [Experiments on the transmission of Tomato aspermy virus by *Cuscuta* spp.]—*Phytopath. Z.*, **30**, 4, pp. 449–452, 1957.

At the Institute for Phytopathology, Aschersleben, Germany [**36**, p. 450], 5 *Cuscuta* spp. were tested for their effectiveness in transmitting tomato aspermy virus. The red-leaved form of *C. subinclusa* transmitted the infection to Samson tobacco a few times, *C. europaea* once only, and *C. campestris*, *C. californica*, and *C. epithymum* not at all. The last-named transmitted the normal green strain but not the yellow strain of cucumber mosaic virus.

GRAHAM (D. C.). **Cross-protection between strains of tomato aspermy virus and Cucumber mosaic virus.**—*Virology*, **3**, 2, pp. 427–428, 1957.

At the College of Agriculture, Edinburgh, cross-protection was studied in tobacco plants (var. White Burley) between Price's No. 6 strain of cucumber mosaic virus and 3 distinct strains of aspermy virus from chrysanthemums. In winter there was no protection, mixed symptoms occurring whatever virus was used as the challenge virus. However, in late spring, when the tobacco plants grew much more rapidly, protection was complete. In *Zinnia elegans* protection was demonstrated in May and June. On the basis of these tests it is considered that definite cross-protection was established between the 2 viruses during periods of normal growth and that tomato aspermy virus should be regarded as a strain of cucumber mosaic virus [cf. above].

PORTER (C. A.) & WEINSTEIN (L. H.). **Biochemical changes induced by thiouracil in Cucumber mosaic virus-infected and non-infected Tobacco plants.**—*Contr. Boyce Thompson Inst.*, **19**, 1, pp. 87–106, 2 fig., 4 graphs, 1957.

The active virus in tobacco plants infected by cucumber mosaic virus and grown

in a medium containing 5 p.p.m. thiouracil was only $\frac{1}{10}$ of that present in plants grown without thiouracil. This effect is ascribed to an aberration in nucleic acid metabolism resulting from the antimetabolic relationship of thiouracil with uracil.

BRADLEY (R. H. E.) & GANONG (R. Y.). **Potato virus Y inactivated in Tobacco inoculated by aphids.**—*Virology*, **4**, 1, pp. 172–181, 1957.

At the Entomology Laboratory, Fredericton, New Brunswick, ultra-violet irradiation of White Burley tobacco plants soon after inoculation with potato virus Y [cf. **36**, p. 573] by means of *Myzus persicae* arrested infection, though spraying them with 0.5% formaldehyde did not. Ultra-violet irradiation before inoculation reduced susceptibility, but placing the plants in more than 50% carbon dioxide did not.

In tests with 8 inhibitors the diluted substances were first sprayed on to young tobacco plants and then rubbed on each plant at a place where it was then probed by an infective aphid. No plants became systemically infected when treated with 2-thiouracil [see above] at 500 p.p.m. or with trichothecin at 10 p.p.m. At these concentrations both materials were phytotoxic. In further tests trichothecin, but not thiouracil, stopped most infections at concentrations which did not appear to damage the plants. Trichothecin, sprayed on to plants 2 days before or 4 hr. after inoculation by infective aphids, reduced infection by over 50%.

HEINZE (K.). **Kann die Gurkenlaus (*Cerosipha gossypii* Glov.) für die Übertragung von Kartoffel- oder Tabakvirosen Bedeutung gewinnen?** [Can the Cucumber aphid (*Cerosipha gossypii* Glov.) attain importance in the transmission of Potato or Tobacco viroses?]—*Naturwissenschaften*, **44**, 22, pp. 591–592, 1957.

In experiments at the Institut für Gärtnerische Virusforschung, Biologische Bundesanstalt, Berlin-Dahlem, *C. gossypii* acted as a vector of the viruses of tobacco etch, swede, and turnip mosaic, and a new strain of potato virus Y responsible for a destructive tobacco disease known as vein-browning [**36**, p. 503]. In general, the aphids were starved for 4–6 hr., allowed to feed for 5–15 min. on the source plant, and then on the test plants for 16–20 hr. *C. gossypii* is very prevalent on potato in urban districts of Germany and appears to be potentially important as a virus-carrier in market-gardens, etc.

SCHADE (CHRISTIANE). **Keimfähigkeit und Lebensdauer des Pollens von Kartoffel-X-Virus-infizierter *Nicotiana acuminata* (Grah.) Hook.** [Germinability and viability of the pollen of *Nicotiana acuminata* (Grah.) Hook. infected by Potato virus X.]—*Phytopath. Z.*, **30**, 2, pp. 225–236, 2 fig., 1957.

The plants used in experiments at the Phytopathologisches Institut der Martin-Luther-Universität, Halle-Wittenberg, were grown in the greenhouse in autumn and spring from 1953–55. Infection by potato virus X did not influence the fertility of *N. acuminata* pollen during the normal growing season but during a protracted period (236 days) there was partial sterility. Ageing of the pollen of diseased flowers proceeded with abnormal rapidity; the increase of amylase activity in freshly germinated pollen of such flowers was 96% lower than that of normal ones, but invertase activity was only 15% below.

HOLLINGS (M.). **Reactions of some additional plant viruses on *Chenopodium amaranticolor*.**—*Plant Path.*, **6**, 4, pp. 133–135, 1 pl., 1957.

The reactions of *C. amaranticolor* to mechanical inoculation with 16 viruses are described [cf. **36**, p. 171]. Symptoms sufficiently distinctive to be diagnostic were induced by the viruses of anemone brown ring (undescribed, from *Anemone coronaria*), barley false stripe [barley stripe mosaic], beet mosaic, tobacco necrosis, pea mosaic, lettuce mosaic, lucerne mosaic, potato aucuba mosaic, and tomato

black fleck (undescribed). Local lesions suitable for quantitative work were induced by the first five viruses mentioned and by chrysanthemum latent, hydrangea ring spot, and turnip crinkle viruses.

A rapid method of indexing carnations for viruses (ring spot, mottle, and vein mottle) is to slit the tip of a shoot vertically or scrape the epidermis and wipe the cut surfaces gently over leaves of *C. amaranticolor* dusted with 400-mesh carborundum. Local lesions are visible in a few days.

CHANT (S. R.). **A die-back of Cacao seedlings in Nigeria caused by a species of *Phytophthora*.**—*Nature, Lond.*, **180**, 4600, pp. 1494–1495, 1957.

In September 1954 a die-back disease of cacao seedlings [37, p. 203], not previously recorded, was present in Agricultural Dept nurseries in various parts of W. Nigeria. It has reappeared since, causing considerable losses, which in one nursery amounted to 70% of the young seedlings. A species of *Phytophthora* near *P. palmivora* was isolated which, inoculated into healthy cacao pods, gave symptoms identical with those of black pod (*P. palmivora*). The symptoms of the seedling disease resemble those caused by *P. palmivora* in Costa Rica [33, p. 713; 36, p. 233] and Surinam [34, p. 711], except that in Nigeria there is no evidence that this fungus affects any part of the seedling or the mature tree other than the pods. A high level of control (95%) was obtained by spraying at intervals of 3 or 6 days with a proprietary copper fungicide; at intervals of 9 or 12 days there was only slight control.

ORELLANA (R. G.) & SOM (R. K.). **Correlation between low temperature and incidence of *Phytophthora* pod rot of Cacao in Ceylon.**—*F.A.O. Pl. Prot. Bull.*, **6**, 1, pp. 6–8, 1 graph, 1957.

A statistical study showed that in Ceylon [31, p. 9] rainfall has little effect on the incidence of cacao pod rot (*P. palmivora* var. *theobromae*) [*P. palmivora*]. Of the 4 weather factors studied, min. temp. showed the highest degree of correlation with disease incidence, though the coefficient was below the 5% level of significance. A highly significant negative correlation was established, however, between the min. temp. of the previous month and the pod-rot incidence of the current month.

FOWLER (R. L.), DESROSIERS (R.), & HOPP (H.). **Evaluation of certain factors affecting the yield of Cacao in Ecuador.**—*Ecology*, **37**, 1, pp. 75–81, 6 graphs, 1 map, 1956. [Received Sept. 1957.]

In an analysis of the effects of the 2 principal diseases of cacao data were obtained from a number of farms on the percentage of foliage killed by witches' broom (*Marasmius perniciosus*) [36, p. 233], estimated by the grower and checked by inspectors, and on the percentage of crop destroyed by *Monilia* pod rot (*M. roreri*) [loc. cit.], estimated by the grower. No significant correlation was found between witches' broom and rainfall but there was a negative one between yield and witches' broom, yield and rainfall, and yield and area of plantation. Rainfall is considered as one element of a complex affecting the 2 diseases. *Monilia* pod rot was correlated with rainfall and with witches' broom but did not appear to be related directly to yield. One of several probable sources of error in the estimates is that no account was taken of direct attack by *M. perniciosus* on the pods which, according to other studies (unpublished), may be responsible for losses equal to those caused by *M. roreri*.

GARCÍA (C.) & NAUNDORF (G.). **Observaciones sobre los Cacaotales del Río Mira, con especial referencia a la enfermedad 'escoba de bruja'.** [Observations on Cacao plantations of the River Mira, with special reference to 'witches' broom'.]—*Cacao en Colombia*, **4**, pp. 5–9, 1955. [Received Sept. 1957.]

In a survey of pests and diseases of cacao plantations [cf. 36, p. 233 and below] on the River Mira below Candelilla, undertaken on behalf of the Campaña Nacional

de Cacao, Palmira, witches' broom (*Marasmius perniciosus*) was found to be the most important disease, followed by moniliasis [*Monilia roreri*]. The variety Pajarito [loc. cit.] was particularly susceptible to both, while Nacional and Vegetal were resistant to *Monilia*. *Ophiostoma* [*Ceratocystis*] *fimbriata* and *Phytophthora palmivora* were not encountered; *Colletotrichum theobromicola* [35, p. 427], *Diplodia* [*Botryodiplodia theobromae*], and *Thielaviopsis* [*Ceratocystis* ? *paradoxa*: cf. 35, p. 883] were rare.

GARCÍA (C.). **La escoba de bruja en Colombia.** [Witches' broom in Colombia.]—*Cacao en Colombia*, 5, pp. 19–23, 1956. [Received Sept. 1957.]

As the outcome of a survey by the Campaña Nacional de Cacao, Palmira, the presence of witches' broom (*Marasmius perniciosus*) [see above] in the basins of the rivers Meta [31, p. 108] and Humea (*Agricultura trop.*, 7, 1, pp. 27–32; 2, pp. 49–56, 1951) is confirmed; the disease was also present in the Ocoa and Negro basins, in the localities of Acacías and Guamal, and in 3 plantations near San José del Guaviare.

The var. Pajarito [see above], derived from the Trinitario complex, was the most susceptible. The sub-types Angoletas and Cundeamores of Forastero exhibited various levels of infection. Criollo cacao was the most resistant, trees remaining free from infection even when surrounded by infected Pajarito. *Monilia* [*roreri*: loc. cit.; 35, p. 427] infection was not encountered. It is concluded that witches' broom is not widespread in E. and S.E. Colombia, whence it has apparently spread to the Guaviare and Meta basins and the Intendencia del Meta.

NAUNDORF (G.). **Nueva contribución al problema de la moniliasis en Cacao y su represión.** [A new contribution to the problem of moniliasis in Cacao and its control.]—*Cacao en Colombia*, 4, pp. 11–14, 1955. [Received Sept. 1957.]

At the laboratories of the Campaña Nacional de Cacao, Palmira, pods were examined at harvest for symptoms of black spot (*Monilia roreri*) [cf. 35, p. 426] in the vessels of the stalk; 200 cushions which had produced affected fruits were marked. As the incidence of the disease on fruit from these at subsequent harvests was slightly less than that in the plantation as a whole, it was concluded that there had been no infection from the cushions.

Pentatomid bugs (*Mecistorhinus tripterus*) proved to be highly effective vectors of the disease [see below]. As a preliminary trial of copper oxide with BHC (1.5 kg.: 250 g./400 trees; 3 applications at 2-week intervals) gave very promising results large-scale trials are in progress on plantations in the Cauca valley.

SEPÚLVEDA L. (R.). **Biología del *Mecistorhinus tripterus* F. (Hem. Pentatomidae) y su posible influencia en la transmisión de la moniliasis del Cacao.** [The biology of *Mecistorhinus tripterus* F. (Hem. Pentatomidae) and its possible influence on the transmission of moniliasis of Cacao.]—*Cacao en Colombia*, 4, pp. 15–42, 15 fig., 1955. [English summary. Received Sept. 1957.]

At the Estación Agrícola Experimental, Palmira, cacao pods exposed to *M. tripterus* after application of conidia of *Monilia roreri* [see above] developed 62% infection, compared with 28% in those subjected to conidia alone. Infestation was heavy at the time of the experiment and it was assumed that all pods had been injured by the feeding bugs. In the absence of *M. roreri* feeding wounds are circular dark patches 0.5–1 mm. diam., mostly close to the peduncle and of no importance.

IDROBO M. (S.) & CARDEÑOSA B. (R.). **Grave epifitotia en Colombia causa el *Ceratostomella fimbriata* (E. & H.) Elliot en Cacao, *Theobroma cacao* L.** [A serious epiphytotic in Colombia caused by *Ceratostomella fimbriata* (E. & H.) Elliott on Cacao, *Theobroma cacao* L.]—*Cacao en Colombia*, 5, pp. 25–27, 1956. [Received Sept. 1957.]

NAUNDORF (G.), IDROBO (S.), & SANCLEMENTE (M.). **Transmisión y diseminación del *Ophiostoma fimbriata* causante de la pudrición azul en el Cacao.** [Transmission and dissemination of *Ophiostoma fimbriata*, cause of blue rot of Cacao.]—*Ibid.*, pp. 29–33.

NAUNDORF (G.). **La relación entre *Phytophthora faberi*, *Ophiostoma fimbriata* y *Xyleborus* sp.** [The relationship between *Phytophthora faberi*, *Ophiostoma fimbriata*, and *Xyleborus* sp.]—*Ibid.*, pp. 35–36.

IDROBO (S.) & NAUNDORF (G.). **Producción de toxinas por el *Ceratostomella fimbriata* en Cacao.** [Toxin production by *Ceratostomella fimbriata* in Cacao.]—*Ibid.*, pp. 37–39, 1 graph.

NAUNDORF (G.), IDROBO (S.), & SANCLEMENTE (M.). **Contribución a la lucha contra *Ophiostoma fimbriata*.** [Contribution to the control of *Ophiostoma fimbriata*.]—*Ibid.*, pp. 41–45.

In the 1st of these 5 papers from the Campaña Nacional de Cacao, Palmira, the authors report the isolation of *C. [Ceratocystis] fimbriata* from cacao in the region of Puerto Tejado (Cauca), Colombia, and reproduction of the disease by reinoculation. A shade tree, *Gliricidia sepium*, also developed infection when inoculated, while other shade trees or trees commonly associated with cacao in this region, which are enumerated, did not. The name 'blue rot' is suggested for the disease, some current synonyms being noted.

The 2nd paper reports experiments indicating that the disease is transmitted by contaminated machetes and by shot-hole borers (*Xyleborus* sp.). Wind and rain also play a role by distributing the infectious excrement of these beetles.

The 3rd paper reports two experiments in which experimental lesions of *P. faberi* [*P. palmivora*] were rapidly invaded by *Xyleborus* beetles carrying conidia of *C. fimbriata*, from which typical 'blue rot' subsequently developed. Treatment of lesions of *P. palmivora* with a cicatrizing paste preventing the access of insects is recommended.

In the 4th paper the authors report that foliage sprays of urea prolonged the life of affected trees. As this phenomenon has been observed in elms infected by *Ceratostomella [Ceratocystis] ulmi*, where urea acts as an antidote to fungus toxin [cf. 29, p. 543], it seemed likely that a toxin might be involved here also. This was confirmed by the reaction of tomato plants to hot and cold water extracts of affected wood and bark.

The last paper reports that of a number of therapeutants examined only leaf sprays of urea and trunk injection with oxyquinoline sulphate prolonged the life of affected trees.

NOBLE (M[ARY]). **Cereal seed health. Results of a laboratory seed survey.**—*Scot. Agric.*, 36, 2, pp. 86–90, 1956. [Received 1957.]

As seed testing is generally done before disinfection, the results described here, obtained during a 4–5 years' survey, are not to be taken as representative of seed as generally sown. The seed is sown under 1½–2 in. of moist, sterile sand or vermiculite and kept at 10 to 12° C. for about 14 days.

In the 1st year average infection in all oat samples was 9% leaf spot caused by *Helminthosporium [Pyrenophora] avenae* [24, p. 177] and 14% brown foot rot (*Fusarium nivale* [*Calonectria nivalis*: 36, p. 582]), and in the second year 12% and 16%, respectively. Brown foot rot of wheat [*C. nivalis*: loc. cit.], not a common seed-borne disease in Britain, was found for the first time on barley in Scotland; it was the principal seed-borne disease of this crop. In 1953–4 *F.* infection of wheat was 20%, with 68% healthy germination (compared with an official figure of 94%). In 1954–5 these percentages for wheat were 25 and 50 and for barley 20 and 53.

Septoria nodorum [cf. **36**, p. 337] is frequently seed-borne on wheat, causing a form of brown foot rot at the base of the seedlings. *Helminthosporium* [*Pyrenophora*] *teres* was also found, generally with *F.* brown foot rot. *H. gramineum* was not found in barley survey samples and is probably rare in Scotland, though still common in England and Scandinavia.

Tests with treated seed indicated that leaf spot of oats and brown foot rot of all three cereals are often transmitted in treated seed, even when mercurial fungicides are applied at 2 oz./bush., owing to the fact that the infection lies deep in the grain. Seed disinfection is often unsatisfactory owing to inefficient application of the chemical.

HIRAI (T.) & MATSUI (C.). **An electronic microscope study of the Wheat leaf cells infected with the Wheat mosaic virus, Marmor tritici Holmes.**—*Forsch. PflKr.*, Kyoto, **6**, 2, pp. 61–65, 6 pl., 1956. [Received 1957.]

Electron micrographs at Nagoya University, Anzjo, Japan, showed a predominance of disintegrated chloroplasts in cells infected by the virus, together with small, round unidentified particles. X-bodies were recognized in both epidermal and mesophyll cells, but not virus particles. Rod-shaped or spherical granules, possibly mitochondria or sphaerosomes, were evident near the chloroplasts in uninfected leaf cells.

BASILE (RITA). **Identificazione di razze fisiologiche di Puccinia graminis tritici Erikks. et Henn. provenienti dell' Algeria e dalla Grecia.** [The identification of physiologic races of *Puccinia graminis tritici* Erikks. & Henn. from Algeria and Greece.]—*Boll. Staz. Pat. veg.*, Roma, Ser. 3, **14** (1956), 2, pp. 179–181, 1957. [English summary.]

Races of *P. graminis* from Greece, identified provisionally as N and 16 [**36**, p. 12], are now assumed to be unreported and are designated R8 and R9, respectively [cf. **36**, p. 579, *et passim*].

BASILE (RITA). **Razze fisiologiche di Puccinia graminis tritici Erikks. et Henn. isolate da acidiocnidi di Berberis vulgaris raccolto durante l'estate 1956, in zone alpine.** [Physiologic races of *Puccinia graminis tritici* Erikks. & Henn. isolated from acidiocnides from *Berberis vulgaris* collected during the summer of 1956 in Alpine areas.]—*Boll. Staz. Pat. veg.*, Roma, Ser. 3, **14** (1956), 2, pp. 183–188, 1 fig., 1957. [English summary.]

Acidiocnides of *P. graminis* on leaves of barberry collected in the provinces of Trento, Belluno, and Novara, Italy, inoculated on Little Club wheat seedlings gave 7 physiologic races of the fungus [**36**, p. 579]: 21 and 75 are very common in Italy, 207 and R19 have previously been isolated there, R48 and R49 appear to be new, and 194 is new to Europe.

GALLWEY (B. M. G.). **The identification of races of Puccinia graminis in South Africa.**—*Robigo*, 1957, 4, p. 15, 1957. [Spanish translation.]

The 5 races of stem rust (*P. graminis*) isolated in S. Africa [**36**, p. 640] have been designed for convenience KS/1–5, as their reactions on wheat differentials are not in all cases identical with, though approximating to, Stakman's races 11, 15, 16, 21, and 34. KS/5, the most common, occurred in 91% of the samples collected during 1954–56. There is no evidence of natural survival through the hot, dry summer months in the winter rainfall area, but the rust overseasons in the George district, which has rainfall the year round.

BOASSO (CELIA). **Physiologic races of some of the cereal rusts isolated in Uruguay in 1956.**—*Robigo*, 1957, 4, pp. 11–12, 1957. [Spanish translation.]

Races of *Puccinia graminis* isolated from wheat in Uruguay [**34**, p. 290] included

11, 17, and, most commonly, 15B, but not 42. Only race 14 of *P. hordei* [cf. 36, p. 92] was found on barley. Race 4 of *P.g. avenae* was present on oats [33, p. 528]; the races of *P. coronata avenae* [loc. cit.] could not be classified.

GREEN (G. J.) & KERBER (E. R.). **Pathogenicity of certain isolates of Wheat stem rust to durum Wheat varieties.**—*Plant Dis. Reprtr.*, 41, 10, pp. 848–852, 1 graph, 1957.

In a survey of physiologic races of *Puccinia graminis* on wheat in Canada in 1956 [36, p. 686] 15B-4, which could attack the new durum varieties Ramsey and Towner, comprised about 20% of the isolates; 15 and 15B-1 L, virulent to Langdon but less so to Yuma, were rare. Seedlings of 7 numbered lines were not attacked by any of the new isolates or the 6 races present.

SHAW (M.) & SAMBORSKI (D. J.). **The physiology of host-parasite relations. III. The pattern of respiration in rusted and mildewed cereal leaves.**—*Canad. J. Bot.*, 35, 3, pp. 389–407, 6 graphs, 1957.

In this contribution from the Dept of Biology, University of Saskatchewan, Saskatoon [cf. 36, p. 179], the first leaves of the resistant wheat Khapli and the susceptible Little Club were inoculated with race 15B of *Puccinia graminis*. The O uptake then rose to 2 or 3 times the normal level, more rapidly in Khapli than in Little Club, and then declined, sooner and more sharply in the former. The respiratory quotient remained near 1 until the peak was reached, when it fell to 0.8–0.85 in Khapli. The initial mean rate of CO₂ output in N (INR) during the 1st hour remained close to that for healthy tissue but fell during the respiratory decline. The respiratory pattern for Atlas and OAC 21 barley infected by mildew (*Erysiphe graminis*) [cf. 36, p. 523] was essentially similar. The ratio between INR and output in air (INR:OR) was 1.2 for uninfected tissue and indicated the operation of a Pasteur effect. With rusted tissue there was little or no increase in NR as O uptake rose and the INR:OR value decreased to 0.2–0.3. It is possible that the Pasteur effect is much reduced in infected tissue [35, p. 757].

The percentage stimulation of O uptake by 10⁻⁵ M 2,4-dinitrophenol in uninfected tissue was greater than in diseased tissue. Results from leaf disk experiments with glucose containing radio-active C indicated that the pentose phosphate pathway is of greater importance in diseased than healthy tissue. It is concluded that infection by *P. graminis* and *E. graminis* both increases the respiration rate and alters the respiratory pathway in host tissue.

SAMBORSKI (D. J.) & SHAW (M.). **The physiology of host-parasite relations. IV. The effect of maleic hydrazide and indoleacetic acid on the rust resistance of Khapli and Little Club Wheats.**—*Canad. J. Bot.*, 35, 4, pp. 449–455, 2 pl., 1957.

In further studies [see above] daily applications of maleic hydrazide or indoleacetic acid to sand cultures in which wheat seedlings of the varieties Khapli (rust reaction type 1) and Little Club (type 4) were growing were begun 5 days before (10 days after sowing), on the day of, and 5 days after inoculation with race 15B of *Puccinia graminis*. Treated with maleic hydrazide at 5 or 10 mg. from the 5th day before and from the day of inoculation Khapli seedlings developed type 4 rust pustules and growth and flowering were inhibited. Indoleacetic acid (0.5 mg.) stimulated growth and flowering and increased the resistance of Khapli. Neither treatment altered the reaction of Little Club. Spores from pustules on plants treated with maleic hydrazide gave normal rust reactions on untreated plants.

The simultaneous application of uracil did not alter the effect of maleic hydrazide on plant growth and rust development. Rust development in the presence of maleic hydrazide was inhibited by thiouracil.

OLIEN (C. R.). **Studies on necrosis in the infection of Khapli Emmer by the stem rust fungus, *Puccinia graminis* var. *tritici*.**—*Diss. Abstr.*, 17, 6, p. 1171, 1957.

The necrotic fleck symptom caused by *P. graminis* with certain wheat-race combinations is associated with high resistance. In the present study at the University of Minnesota various electric fields were applied to developing lesions produced by inoculation of Khapli Emmer with race 56, this combination being chosen because the large necrotic spots, first apparent 1 week after infection, seemed especially suitable for study. Displacement of the necrotic area from the region of mycelial development occurred. From this and other data it was concluded that a single negatively charged substance is responsible for the necrosis of the necrotic fleck symptom.

LEVINE (M. N.) & GEDDES (W. F.). **Effect of leaf and stem rust on productivity, desiccation rate, and kernel weight of spring Wheat at successive stages of development.**—*Cereal Chem.*, 34, 6, pp. 410–421, 1957.

Studies have been in progress at the Minnesota Agricultural Experiment Station since 1935 to determine the exact effects of leaf and stem rusts [*Puccinia triticina* and *P. graminis*] on the yield and quality of spring wheat [cf. 22, p. 294; 35, p. 665, *et passim*] and the value of chemotherapeutic fungicides in the control of the pathogens. Methods are described and a tabulated survey of outstanding results of experiments from 1935–42 is given.

Although the seasonal stem rust loads were consistently lighter than those of leaf rust, moisture losses during ripening were accelerated much more by the former than by the latter. This was reflected in a more marked decrease in the dry-matter weight of grain/tiller and a lower average kernel weight for plants infected by *P. graminis*.

An increase of 65% in the average leaf rust load from 1939–42 reduced the average dry-matter weight of the heads by 12.5, the grain yield by 33, and the test weight by 5.4%, the corresponding decreases for a 31.7% increase in stem rust being 24.6, 45.2, and 11, respectively. Thus, in the susceptible Ceres or Marquis varieties, an average stem rust load of 35.8% caused a yield reduction of 8.4 bush./acre, while in Thatcher the decrease from an average leaf rust load of 87.5% amounted to 7.6 bush. In both there was a test weight fall of 2.2 lb./bush. Stem and leaf rusts reduced the average kernel weights by 5.3 and 3.5 mg., respectively. Whereas the loss/acre of \$8.78 from *P. graminis* was little higher than that caused by *P. triticina* (\$8.06), calculated by % they were 46.6 and 36.8, respectively.

When inoculation was delayed until the filling stage the effect was equal to if not more favourable than when infection was arrested by sulphur-dusting at or soon after jointing.

STAPLES (R. C.). **Changes in the organic acid composition of Wheat leaves infected with the leaf rust fungus.**—*Contr. Boyce Thompson Inst.*, 19, 1, pp. 1–18, 6 graphs, 1957.

The citrate content of the leaves of Thorne wheat seedlings inoculated at 8 days with race 9 of *Puccinia rubigo-vera* f.sp. *tritici* [*P. triticina*: see below] increased from 14th–23rd day, whereas there was little change in the uninoculated controls. There was an increase in malate and a decrease in aconitate in both healthy and diseased leaves during the same period, the changes being enhanced by infection, but only to a small degree.

STAPLES (R. C.). **The organic acid composition and succinoxidase activity of the uredospore of the leaf and stem rust fungi.**—*Contr. Boyce Thompson Inst.*, 19, 1, pp. 19–31, 7 graphs, 1957.

The resting uredospores of *Puccinia rubigo-vera* f.sp. *tritici* [*P. triticina*: see above]

and *P. graminis* f.sp. *tritici* were shown by paper chromatography to contain malonate, citrate, succinate, malate, fumarate, and aconitate. O uptake was stimulated by succinate, but the succinate oxidizing system was inhibited by malonate and in *P. triticina* also by cyanide.

CHIN (K.-J.), HO (C.-S.), CHANG (K.-C.), CHOU (S.-H.), & HSUEN (L.-H.). **On the over-wintering of the uredostage of Wheat stem rust and leaf rust in the Dairen-Lushun district.**—*Acta phytopath. sinica*, **3**, 1, pp. 87–97, 1957. [Chinese. Abs. from English summary.]

The results of 4 years' study on wheat stem rust [*Puccinia graminis*] and leaf rust [*P. triticina*: **29**, p. 20] showed that volunteer wheat in autumn is usually the over-wintering host for both rusts, and also for over-summering of leaf rust. The uredospores on cut straw are much less able to over-winter than those on living plants.

JOHNSTON (C. O.). **Physiologic races of *Puccinia rubigo-vera* f. sp. *tritici* in the United States in 1956.**—*Plant Dis. Repr.*, **41**, 10, pp. 853–855, 1 graph, 1957.

In 218 collections of *P. rubigo-vera* f. sp. *tritici* [*P. triticina*] on wheat received at the Kansas Agricultural Experiment Station, Manhattan, in 1956 from 22 States, 23 races were identified [cf. **36**, p. 754]. Race 122 was the most abundant and widely distributed, followed by race 5; 11 and 1 were the most important in the N.W. area and the former was abundant in Texas; the most prevalent in the Great Lakes district was again 58.

FREITAS (A. P. C.). ***Puccinia rubigo-vera tritici* in Portugal. (Variation of number of physiologic races present each year.)**—*Robigo*, 1957, 4, pp. 5–7, 1957. [Spanish translation.]

The results of an 8-year survey of the physiologic races of *P. rubigo-vera* [*P. triticina*] on wheat in Portugal [**33**, p. 716] indicate that intensity of attack varies from year to year according to the temperature and rainfall in spring. In 1953, with a warm, dry May and June, rust attacks were slight and the 33 rust cultures established were all of race 11. In 1954, with weather favourable for rust development, 12 races were isolated from 93 samples. It is evident from the data that race 11 is of importance in Portugal.

CHEN (S.-M.), CHOU (C.-P.), LEE (S.-P.), WANG (K.-N.), OU-YANG (Y.) [Y (O.-Y.)], HUNG (S.-W.), LU (S.-I.), YANG (T.-M.), & WU (W.-C.). **Studies on the epidemiology of stripe rust of Wheat in North China.**—*Acta phytopath. sinica*, **3**, 1, pp. 63–85, 1 fig., 3 graphs, 1957. [Chinese. Abs. from English summary.]

At the North China Agricultural Research Institute the seasonal development of stripe rust [*Puccinia glumarum*] of wheat [**37**, p. 153] was studied with a view to forecasting epidemics. There was generally little or no rust when sowing was after the end of Sept. The rust is capable of over-wintering as dormant mycelium in infected leaves. Dry weather and low soil moisture in early spring do not favour development and they reduce over-wintering. Over-wintering inoculum was the most important factor for local epidemics, though long-distance air-borne spores may also play a part. Uredospores could not over-summer on volunteer wheat, and though rust from *Elymus chinense* and *Agropyron* spp. could infect certain varieties when inoculated, under natural conditions these grasses play little part in summer survival. Spore trapping indicated that the Chang-Chia-Kow region and certain parts of Inner Mongolia, where spring wheat matures as late as the end of Aug., were probably the reservoir of the fungus for autumn infection. The disease is most severe in well-irrigated and autumn-flooded lands. Suitable observations should make the forecasting of rust epidemics possible.

PICHLER (F.). **Physiologisch-chemische Untersuchungen mit Weizenbrandsporen.**

II. Atmung. [Physiologico-chemical studies on Wheat bunt spores. II. Respiration.]—*Phytopath. Z.*, **30**, 1, pp. 106–111, 1957.

In continuation of previous studies [33, p. 716] a simple method is described for the determination of O consumption by *Tilletia tritici* [*T. caries*] spores. A 300-ml. Winkler flask with 0.1 g. spores is filled with distilled water, covered with a glass lid, and placed for 48 hr. in a refrigerator at 10° C. with artificial illumination, being shaken for the second 24 hr. The spores on the surface are then pipetted into a similar 100 ml. flask and the O consumption determined by Winkler's method. For tests on the effect of fungicidal solutions, 0.2 g. spores are emulsified with 10 ml. of the chemical and left standing for 15–30 min. The emulsion is then poured on to a moistened filter in a bottle and the chemical withdrawn by suction. After repeated washing of the spores with distilled water the filter is dried for 48 hr., and then 0.1 g. samples are examined.

The % O consumption measured in 1955 of material collected in 1954 was 64.7, while the corresponding figures for 1953, 1952, and 1951 were 41.5, 38, and 8.8, respectively [cf. 7, p. 83]. Treatment with mercurials at standard rates and for the usual periods inhibited spore respiration to such an extent as to preclude germination. For instance, 30 min. immersion in mercuric bromide and mercuric chloride (both at 1/200 mol.), ceresan-liquid (0.5%), or duphar-liquid (0.1) reduced O consumption in 48 hr. from 72.8 to 4.1, 6.5, 7.4, and 5.6 mg., respectively.

DEWEY (W. G.). **Genetic and pathological studies with dwarf bunt of winter Wheat.**
—*Diss. Abstr.*, **17**, 1, p. 8, 1957.

Because of the difficulty in obtaining consistent infection of wheat with *Tilletia contraversa* use was made of the similarity in reaction of *T. contraversa* and of race T-16 of *T. caries* [36, p. 392], reaction to the latter being taken to indicate dwarf bunt reaction in these tests at Cornell University. Resistance appeared to be dominant and dependent on several factors. Reaction to the 2 pathogens and a composite of *T. foetida* races showed significant correspondence, and the latter was taken to be as good an indicator of dwarf bunt reaction as race T-16. A possible linkage was found between leaf rust [*Puccinia triticina*] reaction and that of T-16.

Straw cover on seedlings in the test nurseries in the autumn and removal in the spring has been noticed to increase the incidence of dwarf bunt, the straw cover exerting its main effect during the winter months.

Experiment suggested that the pathogen may enter seedlings at a more advanced stage of their growth than previously supposed. The difficulty in obtaining consistent infection is attributed to the irregular germination of the chlamydospores.

NEURURER (H.). **Starkes Auftreten der Braunfleckigkeit des Weizens in Österreich.**
[A heavy outbreak of brown spot of Wheat in Austria.]—*Pflanzenarzt*, **10**, 11, pp. 105–107, 4 fig., 1957.

From the Bundesanstalt für Pflanzenschutz, Vienna, the author reports that glume blotch (*Septoria nodorum*) was serious on wheat in Austria in 1957 [cf. 37, p. 32], and that it can no longer be regarded as solely affecting weakened plants. After a brief description of the disease and possible control measures he concludes that it is best checked by cultural measures promoting healthy growth and rapid maturation of the crop.

BECKER (C. J. F.). **Onderzoek naar de afrijpingsziekten van Tarwe.** [Investigation of the ripening disease of Wheat.]—*Meded. phytopath. Lab. Scholten*, 1957, pp. 87–95, 5 fig., 1957.

In 1954 many wheat varieties in the Netherlands suffered from glume browning

(*Septoria nodorum*) [cf. above]. In 1955 when the weather was less favourable for the disease Carpo and Strube 4098, though considerably infected the previous year, were not attacked, whereas Heine 13161, Selkirk, and Atlas 50 and 66, free in 1954, bore glume lesions in 1955. Especially striking were the purple-brown linear lesions on the glumes and stalks.

Infection was greater on the plant organs facing N. and N.W. than on the sunny side. Meteorological records showed that the years of severe epidemics were the ones when rain was fairly continuous from mid-June to the end of July.

At maturity infection of the ears by *Fusarium* spp. was often severe, particularly of Heine 13161, whereas Heine 13037 was healthy. Investigation of the pericarp of 10 wheat varieties showed that one-third of the grains was infected by *F.* spp. and a further third by *Alternaria*. Grains inoculated with spore suspensions of *A. tenuis*, *F. avenaceum*, and *Helminthosporium sativum* [*Cochliobolus sativus*] developed 'black point'. Seedlings from such grain were often infected in the coleoptile and first leaves. Inoculation with *C. sativus* at the 'milk' stage prevented the grains from reaching max. size. Later infection was also deleterious and caused 'black point'. *C. sativus* from wheat was pathogenic to barley.

POWERS (H. R.). **Overwintering and spread of Wheat powdery mildew in 1957.**—*Plant Dis. Repr.*, **41**, 10, pp. 845–847, 1957.

At Beltsville, Maryland, powdery mildew (*Erysiphe graminis*) [36, p. 755] was observed in a plot of Purplestraw wheat during the winter of 1956–7. Severe natural infection occurred in Oct. A small percentage of conidia remained viable during the winter and overwintering lesions served as centres of infection in the spring. A race virulent to Chul was collected at Charleston, S. Carolina, and one attacking Normandie at Kearneysville, W. Virginia. Both varieties are usually considered resistant and the danger of basing the resistance of future commercial varieties on only one factor is pointed out.

HAMPTON (R. E.), SILL (W. H.), & HANSING (E. D.). **Barley stripe mosaic virus in Kansas and its control by a greenhouse seed-lot testing technic.**—*Plant Dis. Repr.*, **41**, 9, pp. 735–740, 1 graph, 1 map, 1957.

At Kansas State College, Manhattan, barley plants grown from seed heavily infected by barley stripe mosaic virus [35, p. 441] developed the most pronounced symptoms at high light intensity (10,000 ft. candles) and temperatures of 70°–85° F. Of the 206 samples of winter barley seed from the 1955 and 1956 Kansas crops tested in the greenhouse under optimum conditions for symptom expression 63 contained infected seed, the over-all infection for all samples being 2.4% with an average of 8.5% diseased plants in all infected samples. The corresponding figures for 212 samples of spring barley tested were 73, 2.8%, and 8.9%.

The technique described would be satisfactory for the elimination of heavily infected seed lots during certification.

GRASSO (V.), MADALUNI (ANNA L.), & MENNA (G.). **Indagini preliminari sui danni prodotti dai carboni del Grano e dell'Orzo.** [Preliminary investigations into the losses caused by the smuts of Wheat and Barley.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **14** (1956), 2, pp. 249–259, 1957. [English summary.]

Preliminary investigations in the provinces of Frosinone, Latina, Rome, and Viterbo, Italy, showed wheat smut (*Ustilago tritici*) [*U. nuda*: 33, p. 522; 34, p. 439] to be of no economic importance locally. Barley smuts (*U. hordei* [34, p. 363], *U. nuda*, and *U. nigra* [cf. 32, p. 550]), however, cause considerable damage. The prevalent species [on barley] is *U. hordei*, which occurs almost everywhere, and a campaign to control it is urgently necessary.

WILLIAMS (D. E.) & VLAMIS (J.). **Manganese and boron toxicities in standard culture solutions.**—*Proc. Soil Sci. Soc. Amer.*, **21**, 2–3, pp. 205–209, 1 fig., 7 graphs, 1957.

At the California Agricultural Experiment Station, Berkeley, during the spring and summer of 1953, a severe necrosis was observed on the older leaves of Atlas barley grown in standard Hoagland culture solutions (double, full, and $\frac{1}{5}$ -strength) with Mn and B contents of 0.5–0.025 p.p.m. Toxicity of B was expressed by large blotches, with tip and marginal burn, and of Mn by freckling; mosaic chlorosis, followed by the development of long, rectangular necroses, accompanied Mn deficiency.

By decreasing Mn from 0.5 to 0.025, while holding the macro-elements at full strength, the Mn content of the leaf tissue was reduced from 235 to 30 p.p.m. and the necrosis virtually eliminated. Similarly, a decrease in B reduced tip burn and blotchiness. An increase in macro-element concentration from $\frac{1}{5}$ to double strength raised the yield from 5.6 to 18.8 g./plant while reducing the Mn content of leaf tissue from 418 to 170 p.p.m. Ca, Mg, and K salts were antagonistic to Mn, reducing its content in the tissue when supplementing the salts already present in the solution. On the other hand, Si repressed Mn toxicity symptoms [see below] without altering Mn content.

In tests performed in Oct.–Nov. of the same year the plants tolerated much higher Mn and B concentrations before showing toxicity symptoms than those grown earlier in the season.

WILLIAMS (D. E.) & VLAMIS (J.). **The effect of silicon on yield and manganese-54 uptake and distribution in the leaves of Barley plants grown in culture solutions.**—*Plant Physiol.*, **32**, 5, pp. 404–409, 7 fig., 1957.

This is a tabulated report of experiments [see above] which demonstrated the beneficial effect of Si on barley plants grown in standard Hoagland solutions. The mechanism of its action is not yet known.

LUKE (H. H.), CHAPMAN (W. H.), & WALLACE (A. T.). **Reaction of Oats to powdery mildew.**—*Plant Dis. Repr.*, **41**, 10, pp. 842–844, 1957.

In the Florida Agricultural Experiment Station nursery at Quincy heavy infection of oats by *Erysiphe graminis* var. *avenae* [36, p. 808] did not severely reduce grain yield when the attack was arrested by hot weather before the early heading stages. Forage yield, however, was reduced by 40–50%. All Red Rustproof types proved highly resistant; Victorgrain appears to carry one or more genes for resistance [37, p. 36].

GROSSE-BRAUCKMANN (E.). **Über den Einfluß der Kieselsäure auf den Mehлтаubefall von Getreide bei unterschiedlicher Stickstoffdüngung.** [On the influence of silicic acid on the mildew infection of cereals with differential nitrogenous manuring.]—*Phytopath. Z.*, **30**, 1, pp. 112–116, 1957.

In a pot experiment with oats at the Agrikulturchemisches Institut, University of Bonn, increasing application of ammonium nitrate (1.5–2.4 g./pot) resulted in a corresponding intensification of mildew [*Erysiphe graminis*] in plants without Si, which caused heavy reductions in the grain yield without affecting the straw. On the other hand, Si at 30–48 g./pot largely counteracted the deleterious influence of ammonium nitrate. Analyses of grain and straw revealed a decline in Si with increasing supplies of the nitrate.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **6**, 1, pp. 10–12, 1957.

ZAHARA AVIZOHAR-HERSHENZON and J. MENKES report from Rehovot Agricultural Research Station (p. 11) that in June 1956 a few rye plants in the coastal plain of

Mikve-Israel bore sclerotia of *Claviceps purpurea*. An outbreak of the disease on durum wheat was observed for the first time locally in June, 1957. This epidemic appeared to be due to the very humid spring with late rains which followed frosty nights in winter. One to 5 sclerotia were found on each ear of the local varieties Moursi and Zenati-Bouteille. It is supposed that the tendency of both varieties to lodge facilitates primary infection.

GRASSO (V.). **Un possibile metodo veloce per la germogliazione degli sclerozi di *Claviceps purpurea* (Fr.) Tul.** [A possible rapid method for the germination of the sclerotia of *Claviceps purpurea* (Fr.) Tul.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **14** (1956), 2, pp. 243–247, 1 fig., 1957. [English summary.]

At the Stazione di Patologia Vegetale, Rome, sclerotia of *C. purpurea* [cf. **1**, p. 422; **16**, p. 447; **35**, p. 489, *et passim*] from *Cynodon dactylon* in Dec. 1956 produced perithecia after 30–40 days' suspension in tap water in Petri dishes without prior refrigeration.

PÖHM (M.). **Über das Vorkommen von Isolysergsäure-Alkaloiden im Mutterkorn.** [On the occurrence of isolysergic acid alkaloids in ergot.]—*Naturwissenschaften*, **44**, 23, p. 620, 1957.

It was demonstrated at the Pharmazeutisch-Chemische Fabrik A. v. Waldheim, Vienna, by paper chromatography and sclerotial viability assay that the occurrence of dextro-rotatory peptide (isolysergic acid) alkaloids in rye ergot (*Claviceps purpurea*) is generally attributable to incorrect storage, though adverse weather conditions may also lead to more or less extensive rotting of the sclerotia in the ears. Three types of ergot [**34**, p. 638] were differentiated by further studies on races of the fungus which are unable to break down ergotamine once it is formed, namely, A, with a virtual absence of ergotaminine and an ergotamine content of 0.12–0.2% in fresh, ripe sclerotia, nearly all of which were living; B, with ergotaminine content of 0.005–0.05% and ergotamine of 0.2–0.4% (20–80% dead sclerotia); and C, 0.1% ergotaminine and 0.3% ergotamine (only a few dead).

WISER (W. J.). **Inheritance of reaction to *Diplodia zeae* (Schw.) Lév. in *Zea mays* L. ears.**—*Diss. Abstr.*, **17**, 1, pp. 12–13, 1957.

At Purdue University 15 groups of maize progenies were grown in 1954 and artificially inoculated with a spore suspension of *D. zeae* [*D. maydis*; **36**, p. 583] by means of a compressed-air sprayer. The average of ear rot in the parents closely approached that in the F_2 generation and in the two related back crosses. Poor husk cover was significantly correlated with a high level of ear rot in the F_2 progenies when one or both of the parents were susceptible. Late ear declination was associated with a high percentage of the disease in single crosses between very susceptible and resistant or intermediate lines; ear declination and ear rot were always correlated when T_r and M_{14} were the parents.

MESSIAEN (C. M.) & LAFON (R.). **Les champignons nuisibles aux semis de Mais. II. Essais de traitement de semences.** [Fungi harmful to Maize sowings. II. Experiments on seed treatment.]—*Ann. Épiphyt.*, **8**, 2, pp. 209–224, 4 fig., 2 graphs, 1957.

Continuing their experiments [**36**, p. 759], the authors carried out *in vitro* tests on *Gibberella zeae* to compare the effects of various fungicides diluted in the culture medium or their volatile products. Growth after a 48-hr. exposure to the vapour of thiram (a good contact fungicide), methoxyethylmercury silicate, phenylmercury acetate, captan, chloranil, nabam, and copper oxychloride in a closed Petri dish was, respectively, 100, 0, 9, 93, 40, 52, and 104 mm. (untreated 100). Field tests on maize in 1954–56 showed that thiram was effective especially against soil-borne

infection, whereas methoxyethylmercury silicate and nabam (steep) were most effective against internal infection of inoculated seed. No material was entirely satisfactory. The mercury products, dusts or steep, were phytotoxic.

Seed treatment of resistant hybrids appears unnecessary, but because of its low cost, treatment can be used advantageously by co-operative societies and seed merchants. Thiram is recommended, supplemented for early plantings or poor seed by treatment with an organo-mercurial, though this must be given only during the week before sowing. Growers who apply hot-water treatment 12 to 24 hr. before sowing may add 0.5 or 1% nabam or 0.1% methoxyethylmercury chloride to the water.

HOPPE (P. E.). **A comparison of captan and arasan for Corn seed treatment.**—*Plant Dis. Repr.*, **41**, 10, pp. 857–859, 1 fig., 1957.

At the University of Wisconsin captan 75 and arasan 75 were compared by the rolled towel method as protectants for maize seed [35, p. 444 and above]. Both gave good protection to sound seeds at rates of $1\frac{1}{4}$ oz./bush. or higher, germination being 91–100%; captan 75 was equally effective at $\frac{1}{2}$ oz. Seed treated with arasan 75 germinated only 60%. On crown-wounded seeds captan 75 at 1 oz. maintained good protection, 93% of the seeds germinating compared with only 42% for arasan 75 at the same rate.

SHEREMISINOV (N. A.). Пути грибной инфекции семян Кукурузы и меры ее предупреждения. [The paths of fungal infection in Maize grains and measures for its prevention.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.*], **22**, 8, pp. 40–43, 3 fig., 1957.

At the Voronezh Agricultural Institute, U.S.S.R., maize grain of the Odeskaya variety, inoculated with conidia of *Alternaria*, *Botrytis*, *Fusarium*, and *Nigrospora* and stored in dry conditions, developed severe infection only when the grain was taken off the cob. The mycelium penetrated the grains and reached the germ, thus decreasing germination capacity by 52–68%. The severity of the attack in maize on the cob is considerably weaker.

Seeds treated immediately after threshing with 1 g./kg. granosan, 2 g./kg. hexachlorobenzene, or 2 g./kg. mercuran showed no apparent infection by the fungi.

REYES (G. M.). **Rice dwarf disease in the Philippines.**—*F.A.O. Pl. Prot. Bull.*, **6**, 2, pp. 17–19, 2 fig., 1957.

Rice dwarf virus disease [cf. 28, p. 588, *et passim*], generally considered to have been introduced into the Philippine Islands from Japan during the occupation in 1943–4, occurred again in 1956 on seedlings of varieties introduced from the United States. The presence of the vector, *Nephotettix apicalis* var. *cincticeps*, was verified.

As it occurs in the Philippines, the disease is characterized by the presence on the leaves of interrupted, yellowish-white streaks parallel to the veins, sometimes coalescing to produce chlorotic spots or partial chlorosis of the leaf, especially near the base.

Of the 5 American varieties affected, Fortuna had the greatest number of diseased plants. In experimental inoculations with the vector none of the 9 Philippine varieties tested was highly resistant, and, taking death-rate as a supplementary index to varietal susceptibility, Milketan 21, Milbuen 5 and 6, and Milfor 6 were the most sensitive.

POLANÍA S. (R.). **El brusone del Arroz.** [Brusone of Rice.]—*Acta agron. Palmira*, **6**, 4, pp. 173–187, 1956. [16 refs. Received 1957.]

A general account from the literature of rice blast disease (*Piricularia oryzae*).

HIRAI (T.), MATSUI (C.), & ONO (K.). **Electron microscopic observations on the leaf tissues of Rice plants affected by the blast fungus, *Piricularia oryzae* Cav.—***Forsch. PflKr., Kyoto*, **6**, 2, pp. 49–53, 5 pl., 1956. [Received 1957.]

Electron micrographs at Nagoya University, Anzjo, Japan, demonstrated a large accumulation of cytoplasmic material in the infected mesophyll of rice plants resistant to *P. oryzae*, whereas in susceptible varieties only disintegrated chloroplasts were seen. In healthy cells little cytoplasm was to be seen. It is suggested that the resistant condition results from increased phosphorylation stimulating synthesis in the cytoplasm [cf. **35**, p. 863].

SAKAMOTO (M.), SATO (K.), KUDO (S.), & OMATSUZAWA (T.). **Studies on the Helminthosporium leaf blight of Rice plant. Part I. On the outbreak of diseases in a humus-rich muck paddy field.—***Rep. Inst. agric. Res. Tôhoku Univ.*, **8**, 2, pp. 127–144, 15 graphs, 1957.

In this study of the fluctuations of 3 common diseases in a rice field in Miyagi Prefecture, Japan, in 1955, leaf blast (*Piricularia oryzae*) [**36**, p. 614] was found in the early stages of growth and leaf blight (*Cochliobolus oryzae*) [*C. miyabeanus*: **37**, p. 55] in the later, both together affecting the plant from the head-bearing to heading stages. Stem rot (*Helminthosporium sigmoideum* var. *irregulare*) [**35**, p. 790] was most severe before heading. Applications of N delayed development of *C. miyabeanus* but increased leaf blast and stem rot. Conidia of *P. oryzae* occurred most abundantly in the air from mid-July to mid-August, while very few of *C. miyabeanus* were trapped from late June to September.

The changes in susceptibility observed in the field during the growing period were verified by experimental inoculations.

PADMANABHAN (S. Y.). **The relation between loss in viability and seed-borne microflora in Rice.—***Proc. Indian Acad. Sci., Sect. B*, **46**, 3, pp. 155–169, 1957.

Rice of 5 varieties stored in desiccators [at the Central Rice Research Institute, Cuttack] at 75, 90, and 100% R.H. levels had a high moisture content and viability was reduced, but moulds, principally *Penicillium* spp., were present only at 100% R.H. At lower R.H. levels (down to 10%) there was no loss of viability. It was concluded that fungal activity has no direct relation to the inactivation of the embryo in rice grain stored under damp conditions [cf. **36**, p. 663].

MISHRA (J. N.) & CHAKRAVARTI (B. P.). **The so-called 'dakhina' disease of Paddy in Bihar.—***Proc. Bihar Acad. Agric.*, **4**, pp. 142–145, 1 pl., 1955. [Received 1957.]

As the result of an obscure disease of rice known as 'dakhina' [**29**, p. 228] whole fields become suddenly withered, leaves and stalks turn brown and brittle, and if ears have formed they contain no grain. Yellowing tips of the infected leaves turn red and die. Observation over 5 years showed two diseases with different symptoms to be present, one, a yellowing of the leaf tips followed by drying, the other, a general yellowing and stunting of the plants. The first is apparently physiological and may be called 'yellow tip', 'red tip', or 'tip-burn'; if whole leaves die it may be regarded as Dastur's dry leaf disease or pansukh [**16**, p. 833; **36**, p. 57]. The second is considered to be caused by a virus, possibly rice dwarf [cf. **37**, p. 231].

In experiments on rice seedlings in sand culture to investigate the first disease, ammonium or magnesium sulphate had no effect on growth, but lack of aeration seriously affected it and the effect of waterlogging simulated the diseased condition.

LOVISOLO (O.). **Contributo sperimentale alla conoscenza ed alla determinazione del virus agente dell' arrossamento striato del Sorgo e di un mosaico del Mais.** [An experimental contribution to the knowledge and determination of the

virus agent of red stripe of Sorghum and a mosaic of Maize.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **14** (1956), 2, pp. 261–321, 9 fig., 1957. [English summary. 98 refs.]

A full account is given of several years' investigations in Piedmont, Venetia, and Emilia, Italy, into a disease of saccharine sorghum and grain sorghum characterized by a mosaic of the youngest leaves, followed by red stripe, and a mosaic of maize, both caused by the same virus, the host range of which was found experimentally to be confined to sugarcane, *Sorghum halepense*, Sudan grass, sorghum, *S. saccharatum*, *S. bicolor* var. *technicum*, maize, *Setaria viridis*, and *Arundo donax*. With all the sub-species of sorghum tested the symptoms were mosaic, red stripe, and occasionally death, while with maize, Sudan grass, *Sorghum halepense*, and *Setaria viridis* only mosaic developed.

The virus was neither seed- nor soil-borne, but was mechanically transmitted by sap to healthy leaves treated with carborundum; it was also transmitted by the aphids *Rhopalosiphum* [*Aphis*] *maidis* and *Myzus persicae*; the former is the natural vector. Thermal inactivation occurred between 46° and 50° C., the dilution end point was 10⁻³, and longevity *in vitro* between 2 hr. 40 min. and 4 hr. 50 min.; at temps. between -1° and +2° the virus lost its infectivity in 15 to 32 days. The virus appears to belong to the sugarcane mosaic virus complex.

An analytical key is presented to the viruses that infect or can infect the Gramineae.

YU (T.-F.), PEI (M.-Y.), & HSU (H.-K.). **Studies on the red-leaf disease of the Foxtail Millet (*Setaria italica* (L.) Beauv.). I. Red-leaf, a new virus disease of the Foxtail Millet, transmissible by aphids.**—*Acta phytopath. sinica*, **3**, 1, pp. 1–18, 2 col. pl., 2 fig., 1957. [Chinese. Abs. from English summary.]

The symptoms of a new disease of *S. italica* in N. China, studied by the Academia Sinica, Peking, are a reddening of the leaf blade, leaf sheath, and spike on the purple-stem varieties, and on green-stem varieties yellowing of the leaf blade. The discoloration is usually accompanied by general stunting and malformation. The causal virus is transmitted by at least three aphids: *Rhopalosiphum* [*Aphis*] *maidis*, *Macrosiphum granarium* [*M. avenae*], and *Toxoptera graminum*, but was not mechanically transmissible or seed- or soil-borne. The virus proved persistent in the vector, which infected successively at least 27 millet seedlings. The aphid was unable to acquire the virus in 5 min. but did so in 10. An 8 hr. acquisition feeding period was optimum. The incubation period of the virus was 10–32 days, the modal period being 14–20 days.

Maize, *Panicum miliaceum*, *Setaria lutescens*, *S. viridis*, *Digitaria sanguinalis*, and *Echinochloa crusgalli* proved to be hosts. Among 349 *S. italica* varieties examined nine were highly tolerant, though susceptible to aphid transmission. This virus appears to be new and, though resembling the [barley] yellow dwarf virus [cf. **36**, p. 238 *et passim*] in some respects, has a different host range.

COMELLI (A.). **La tristeza des Citrus en A.E.F.** [Citrus tristeza in French Equatorial Africa.]—*Fruits d'outre mer*, **12**, 10, pp. 415–419, 6 fig., 1957.

The probable history of tristeza virus disease of citrus [**36**, p. 526; map 289] in the area is outlined. Its presence has been suspected for some years. In 1938 a collection of 100 citrus varieties from various parts of Africa was assembled at the Botanical Gardens, Brazzaville. In 1945, plants from Nogent grafted on sour orange (*Citrus bigaradia*) were making poor growth, doubtless owing in part to tristeza virus, though this was not suspected at the time. During 1952–55, collections grafted on this stock and grown at Bangui, Fort-Lamy, Fort-Archambaud, and Bukoko were a general failure. In 1954 the author noted at Boko a 20-year-old

shaddock severely affected by stem-pitting; the tree and the whole orchard probably came from the Belgian Congo [35, p. 592]. In June 1957 distinct symptoms of tristeza virus were seen at Madingou on sour lime of local origin, and more recently on Mexican lime at Loudima, both in the Niari Valley. The hybrid Mohtasseb lime bore sunken, longitudinal scratches on the branches, undoubtedly a sign of tristeza, though there were no leaf symptoms. The disease is also present in the French Cameroons. At Ubangui typical stem-pitting was noted on 15-year-old grafted shaddocks from Brazzaville. At Tchad symptoms resembling those of tristeza virus were seen on young grafts in a nursery. There is no doubt that at Brazzaville, Bangui, and Fort-Lamy the virus, if not already present, was introduced in collections from S. Africa and the Belgian Congo. In the Niari Valley the virus has probably long been present in village citrus, as most of the trees came from Brazzaville.

Sour orange should not be used in the area as a stock except for lemon trees. The present situation represents a grave threat to N. Africa. It seems that grafted citrus plants have been sent from Fort-Lamy to Tibesti, a connecting link with N. Africa. It has been recommended that these introductions, dating from the beginning of 1957, should be destroyed.

MCCLEAN (A. P. D.). **Tristeza virus of Citrus: evidence for absence of seed transmission.**—*Plant Dis. Repr.*, **41**, 10, p. 821, 1957.

At the Dept Agric., Pretoria, S. Africa, in 8 years thousands of seedlings of West Indian lime, grapefruit, citron, and sweet lime have been examined for symptoms of tristeza virus infection [36, p. 99]; seedlings of sweet orange, mandarin, rough lemon, and tangelo have been tested by grafting to West Indian lime. There has been no record of transmission of the virus through the seed, though the parent trees were definitely infected.

WEATHERS (L. G.). **A vein-yellowing disease of Citrus caused by a graft-transmissible virus.**—*Plant Dis. Repr.*, **41**, 9, pp. 741–742, 3 fig., 1957.

A vein-yellowing affecting 3 of the 10 limequat trees examined in 2 counties in California differed from any previously described virus disease of citrus. The petioles and veins on some of the leaves appeared slightly swollen and bright yellow, the colour being continuous along all but the smaller veins and sometimes extending downwards into the young branches. The symptoms were persistent and common on old leaves. Symptoms appeared after grafting to West Indian lime, calamondin, Orlando tangelo, Troyer citrange, limequat, lemon, and kumquat, generally within 15–20 days. No citrus trees other than limequat were found to be naturally infected.

CICCARONE (A.). ***Elsinoe australis* Bitancourt et Jenkins, agente di una 'scabbia' degli Agrumi, in Sicilia.** [*Elsinoe australis* Bitancourt & Jenkins, the agent of a Citrus scab in Sicily.]—*Riv. agrumic.*, **2**, 1–2, pp. 31–36, 5 fig., 1957. [English summary.]

From scabbed lemon fruits picked in July 1956 from trees growing in moist, shady conditions in various parts of eastern Sicily the author isolated *Elsinoe australis* [map 55], not previously reported from the Mediterranean basin.

SCHARIF (G.). **L'antracnose des Agrumes à Minab. *Colletotrichum gloeosporioides* Penz.** [Anthracnose of Citrus at Minab. *Colletotrichum gloeosporioides* Penz.]—*Ent. Phytopath. appl.*, *Téhéran*, 1957, 16–17, pp. 4–15, 1957. [Persian. Abs. from French summary, pp. 4–7.]

The author reviews the destructiveness of *C. gloeosporioides* [*Glomerella cingulata*: **28**, p. 378] to lime and other citrus in the last few years. *Diplodia* sp., 2 or 3 spp.

of *Phoma*, 2 spp. of *Ascochyta*, and *Coniothyrium* sp. have also been isolated from diseased trees. A number of contributory environmental factors are noted, including Zn deficiency and unfavourable physical soil conditions.

CALAVAN (E. C.). **Three major root rot diseases of Citrus.**—*Calif. Citrogr.*, **42**, 12, pp. 431–432, 1957.

Phytophthora citrophthora has been detected in all the important citrus areas in California, causing trunk gummosis, fruit rot, foot rot, root cankers, and destruction of feeder roots [cf. **36**, p. 584]. The fungus thrives in a cool or temperate environment and is much commoner than *P. parasitica* in coastal valleys. *P. parasitica* thrives in warm conditions, causing destruction of feeder roots, root cankers, and occasionally foot rot and gummosis: root rot is especially severe in hot desert areas and in warm locations in intermediate valleys, and some root-stocks which are resistant to *P. citrophthora* are affected. Young trees are more often ruined by *Phytophthora* than old ones.

Dry root rot, the destruction of the bark and wood of large roots or the butt of the trunk by a complex of soil micro-organisms, follows the destruction of root bark by various agencies. In active infections the bark is putrid and slimy, and the firm wood beneath is foetid, watersoaked, and discoloured. Pink or white spore masses of *Fusarium* are frequently seen on dead bark near the upper limits of the infection. This is an important and frequently fatal disease where basal trunk areas or large primary roots are wet for prolonged periods following disease or mechanical injury.

MARTIN (J. P.), BAINES (R. C.), & ERVIN (J. O.). **Influence of soil fumigation for Citrus replants on the fungus population of the soil.**—*Proc. Soil Sci. Soc. Amer.*, **21**, 2, pp. 163–166, 1957.

In field studies on various citrus soils in California fumigation with DD, carbon disulphide, chloropicrin, ethylene dibromide, or vapam before replanting generally caused a marked reduction or near destruction of the fungus population [**35**, p. 676], especially of the subsoil. Fungi became re-established but represented relatively few species in comparison with those in untreated soils. In some plots numbers remained relatively low; in others there were more than in untreated soil. Additional species returned with time, but even after 2 or 3 years the populations were markedly affected in many soils. *Trichoderma viride* was stimulated by fumigation much more often than other species.

VIENNOT-BOURGIN (G.). **Le IV^e Congrès d'Agrumiculture en Israel (1956).** [The Fourth Citrus Culture Congress in Israel (1956).]—*Fruits d'outre mer*, **12**, 7, pp. 299–304, 7 fig., 1 map, 1957.

In this account of some aspects of citrus culture in Israel it is stated that considerable progress has been made in the control of post-harvest decay of citrus by *Penicillium digitatum* and *P. italicum* [**36**, pp. 23–25] through the care given to the handling, wrapping, storage conditions, and packing of the fruits. Until fairly recently 25–46% of the fruits transported by boat were unfit for market on arrival at their port of destination. This loss has been reduced to 2–3%, though it is still sometimes as high as 10%.

MARTELLI (G. P.). **La batteriosi o 'piticchia batterica' degli Agrumi.** [Bacteriosis or 'bacterial pit' of Citrus.]—*Inform. fitopat.*, **7**, p. 283, 4 fig., 1957.

A brief, popular account is given of bacterial pit (*Pseudomonas syringae*) [cf. **33**, p. 227], the most prevalent bacterial disease of citrus, particularly lemon and orange, in Italy, the chief points dealt with being the symptoms, weather conditions favouring infection, and control by proper cultural methods and spraying with copper compounds, captan, or antibiotics.

CICCARONE (A.). **Il 'giallume' ('yellow shoot') degli Agrumi in Cina.** [Yellow shoot of Citrus in China.]—*Riv. agrumic.*, **2**, 1-2, pp. 45-50, 4 fig., 1957. [English summary.]

This is a brief account of yellow shoot disease of citrus in China [37, p. 41]. A centre for the organization of control measures has been established by the Chinese Government.

Ninth Annual Report of the Research Department of the Indian Coffee Board (1955-56).—*Bull. Indian Coff. Bd Res. Dep.* **9**, 115 pp., 2 fig., 2 graphs, 2 maps, 1957.

In the mycology section (pp. 70-80) [cf. 36, p. 318] K. V. GEORGE reports further results of spraying trials against *Hemileia vastatrix* at the Coffee Research Station, Balehonnur. There were no significant differences in yield or leaf counts in Sept. 1955 and Feb. 1956 following Bordeaux, wetcol 15, fungi-copper-Geigy, and cupravit. Leaf counts in Sept. 1955 indicated that Shell copper fungicide, Bordeaux, dithane Z-78, and blitox were all superior to perenox; but in Feb. 1956 no significant differences were noticed. In a trial started in 1956 none of the newer proprietary fungicides tested was superior to freshly prepared $\frac{1}{2}\%$ Bordeaux. Low-volume spraying was less effective than high-volume, high-pressure applications, an adequate lifting force being essential to obtain good coverage of the under-surface of the leaves owing to the dense, bushy growth of the plant. *Pellicularia koleroga* survived the hot, dry weather between the monsoons as sclerotia or dormant mycelium in the bark of infected coffee twigs. The best control was obtained by a fungicidal spray (1% Bordeaux, mercurized copper oxychloride, or tuzet) combined with removal of infected twigs.

The incidence of collar rot and post-emergence damping-off (*Rhizoctonia [Corticium] solani*) was lowest in plots which had received a monthly soil drench with Cheshunt compound (1 lb./30 gal.) or Bordeaux (2:2:40 or 4:4:40) and highest in those treated with iodine (1:20,000).

Brown eyespot (*Cercospora coffeicola*) [see below] has recently become more severe in nurseries and new clearings.

NARAYANAN (B. T.). **Brown-eye-spot disease.**—*Indian Coffee*, **21**, 9, pp. 281-282, 292, 1 col. fig., 1957.

The incidence of *Cercospora coffeicola* on coffee [35, p. 765 and above] is increasing, particularly in Saklespur and Mudigere. Attention to cultural conditions in the nursery and spraying with 4:4:40 Bordeaux mixture once a month, or fortnightly if the disease is prevalent, are among the protective measures recommended.

WICKENS (G. M.) & LOGAN (C.). **Plant pathology.**—*Progr. Rep. Exp. Stas. Emp. Cott. Gr. Corp. (Uganda)*, 1956-7, pp. 32-37, 1957.

At the Cotton Research Station, Namulonge [36, p. 244], the epidemiology of boll infection by *Xanthomonas malvacearum* [36, p. 457] is receiving increasing attention. Data obtained indicate a general tendency for stem infections to be closely associated with early leaf infection. In plots laid out to determine the influence of bacterial blight on yield, all those on 1 site, planted with natural seed dressed with agrosan 5 W, remained unaffected throughout the season. Seed inoculation for the other 2 sites resulted in main-stem lesions on up to 22.5% of the plants of the susceptible BP 52/S9, with high leaf infection. There was a significant depression of yield from NC 56 and BP 52/S9 on sites 2 and 3, compared with site 1, a not significant depression for S47, and a very small one for Albar 49.

The data for mean lesion size resulting from needle inoculation and brush inoculation, whether computed only for bolls that became infected or for all bolls inoculated, presented a remarkable parallel. Needle inoculation is much the

simpler, more bolls/plant can be inoculated at one time, escapes are rare, and lesion size is more regular and more easily measured, whereas brush inoculation is more 'natural', not evading any escape-from-penetration mechanism there might be, and providing the best criterion of over-all field susceptibility in the measurement of degree of damage to seed cotton. However, in certain conditions escapes may be excessively numerous.

The albar strains A(55)29, A(55)8, and Albar 49 were those most resistant to boll inoculation, UPA1 came next, followed by the first back-cross UPA14, only slightly more resistant than UPA19 (2nd back-cross), and the BP52 strains.

Infections were shown to occur via the calyx, the bracts, and by vascular movement of the bacterium in the fruiting branch. Calyx infections extend inconspicuously from the tip downwards. Later-formed bolls appear to be more resistant than earlier ones on the same plant.

In a test for susceptibility to *Verticillium dahliae* [loc. cit.] (standard stem inoculation method) the mean severity of attack measured on a 0 to 5 grading was DE 715/6 M, 1.4; B 181, 1.7; S 47, 3; and U4/8161, 3. Two Congo strains, Maniema GAR and C2, possessed a good degree of tolerance and might prove useful as an additional source of resistance genes. The mean loss in yield of seed cotton of 201 naturally infected plants occurring sporadically in the strip mapped for bacterial blight was just over 50% per infected plant.

DARK (S. O. S.) & SAUNDERS (J. H.). **Shambat Station.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Sudan)*, 1956–57, pp. 18–27, 1957.

In 1956–7 the cotton blackarm (*Xanthomonas malvacearum*) situation in the Republic of the Sudan [36, pp. 185, 526] changed, infection being widespread in all varieties in the breeding plots and variety trials at Gezira and Hag Abdulla. The heavy attack (with wet leaf, bractiole, and boll lesions still present at the end of December) appears to have resulted from waterlogging caused by the coincidence of a very heavy, late rainstorm with an irrigation.

ADAMS (F.) & WEAR (J. I.). **Manganese toxicity and soil acidity in relation to crinkle leaf of Cotton.**—*Proc. Soil Sci. Soc. Amer.*, 21, 3, pp. 305–308, 3 fig., 1 diag., 1957.

A Kalmia fine sandy loam with a pH of 4.5 from a river terrace in Alabama, where crinkle leaf of cotton [18, p. 23; 35, p. 450] was severe in June 1956, was investigated in the laboratory and greenhouse at the Alabama Polytechnic Institute, Auburn. An application of CaCO_3 (2,000 lb./acre) or Na_2CO_3 (1,000) prevented the development of the disorder whereas a neutral Ca salt was ineffectual. The 2 carbonates greatly reduced the water-soluble Mn content of the soil.

The use of an apparatus based on the principle of a continually circulating soil solution (*Soil Sci.*, 75, pp. 383–394, 1953) in conjunction with a cation-exchange resin column maintained high acidity of the soil solution while controlling the amount of Mn and Al. By this method the crinkle-leaf symptoms were shown to result from a high level of Mn (11 p.p.m. or more) and may be expected to appear with the development of sufficient acidity in soils with a high potential capacity for the supply of soluble Mn. An adequate liming programme is therefore an essential preventive measure. The natural Al level (1 p.p.m.) in the solution, while apparently somewhat detrimental to plant growth, did not affect the occurrence of crinkle leaf.

CULBERTSON (J. O.). **Registration of improved Flax varieties VII.**—*Agron. J.*, 49, 11, pp. 607–608, 1957. [Received 1958.]

Further registrations in this series [33, p. 154] included Raja, from a cross of Arg. Sel. 1028 \times J.W.S.153B9 made in 1942 at the Cereal Division, Central

Experimental Farm, Ottawa [34, p. 433], and finally selected in 1952. It is resistant to wilt [*Fusarium lini*: 35, p. 609] and N. American races of rust [*Melampsora lini*: 35, p. 526] but is susceptible to pasmo [*Mycosphaerella linorum*]. Rocket (C.I. 1133), from Argentine 8C × Redwing, was first distributed in 1947; it is resistant to rust and anthracnose [*Colletotrichum linicola*: 36, p. 186], moderately resistant to wilt, and susceptible to pasmo.

FABRICATORE (JOLANDA A.). **Le malattie delle piante ornamentali osservata in Italia. Dicotyledoneae. Parte quarta.** [The diseases of ornamental plants observed in Italy. Dicotyledons. Fourth part.]—*Ann. Sper. agr.*, N. S., 11, 5, *Suppl.*, pp. i–xlvii, 1957. [English summary. 305 refs.]

In this final part [cf. 37, p. 170] the author presents annotated lists of the diseases described or reported in Italy as affecting ornamentals of 17 families (Resedaceae to Violaceae).

ISAAC (I.). **The effects of nitrogen supply upon the Verticillium wilt of Antirrhinum.**—*Ann. appl. Biol.*, 45, 3, pp. 512–515, 1957.

In further work at the University College of Swansea isolates of *Verticillium albo-atrum*, *V. dahliae*, and *V. nigrescens*, grown on media sufficiently supplied with NaNO_3 , induced wilt more rapidly in antirrhinum plants growing in soils with a normal or excess N than in plants in an N-deficient soil [cf. 35, p. 893]. Similarly treated isolates of *V. nubilum* and *V. tricorpus* induced a greater incidence of wilt in plants in soil given heavy applications of organic N than in those growing in N-deficient soil; *V. tricorpus* taken from a medium containing much NaNO_3 was pathogenic to plants in N-deficient soil.

The evidence obtained confirmed the view that *V. albo-atrum* is invariably the most virulent species of *V.* infecting antirrhinum, *V. dahliae* and *V. nigrescens* being somewhat and *V. nubilum* and *V. tricorpus* much less so. Irrespective of the soil treatment, isolates grown on a medium deficient in N were less pathogenic than those that had received adequate N. N particularly affected the ability to penetrate the host from the surrounding soil; except for 5 plants infected by *V. albo-atrum* and 1 by *V. nigrescens* the N-starved isolates failed to enter the host. Even when cultures were placed inside wounded plants their virulence was much reduced. The work demonstrates that N supplied to the fungus in culture has a greater influence upon the host-parasite relation than has the supply of N from the soil to the host. The incidence of the disease is, however, often increased by heavy applications of organic N to the soil.

HOLLINGS (M.). **Investigations of Chrysanthemum viruses. II. Virus B (mild mosaic) and Chrysanthemum latent virus.**—*Ann. appl. Biol.*, 45, 4, pp. 589–602, 1 pl., 1957.

Further studies [cf. 35, p. 18] have shown that Noordam's chrysanthemum virus b [32, p. 679; 37, p. 170] is widespread in English chrysanthemum stocks, in which, however, it appears to cause little damage. The name 'mild mosaic' is proposed for the disease produced. The virus infected 10 of 86 plant species tested by mechanical inoculation and grafting. Petunia, which was used as a local lesion test plant, was much less susceptible in summer, some plants displaying genetical resistance at all seasons. The concentration of infective virus b in chrysanthemum sap decreased in summer.

The virus was transmitted by *Myzus persicae*, *Macrosiphum euphorbiae*, *Aulacorthum solani*, *Macrosiphoniella sanborni*, and *Brachycaudus helichrysi* of 6 aphid species tested, the aphids becoming infective with short acquisition feeds and losing infectivity within 1 hour. Chrysanthemums were difficult to infect mechanically, and the virus was not disseminated by leaf contact or knives used for taking

cuttings. The symptoms on 32 varieties tested are tabulated. Infective sap contained rod-shaped particles 750 by 17 m μ . Three strains of the virus were differentiated by the reactions they produced in petunia; one prevented infection by a second. The thermal inactivation point of the virus lay between 70 and 75° C., the dilution end point ranged from 1/10–1/1000, and inactivation occurred within 24 hr. at 18°.

Two hitherto unrecorded viruses that cause local lesions in petunia were found in chrysanthemums. One of these, vein mottle virus, resembled virus b somewhat, but the latter did not give protection against it and it severely damaged some chrysanthemum varieties. It differed also from chrysanthemum virus Q [30, p. 162]. The other, chrysanthemum latent virus, was carried without symptoms by 11 varieties of chrysanthemum; 13 of 27 plant species were readily infected by mechanical inoculation. It had a dilution end-point of 1/200–1/500, was inactivated after 10 min. at 70°, and within 48 hr. at room temperature. It was not spread by the cutting knife, root contact, or by 2 species of aphid. It seems to be very rare in English stocks.

STALDER (L.) & SCHÜTZ (F.). **Untersuchungen über die kausalen Zusammenhänge des Erikawurzelsterbens.** [Studies on the causal associations of root drying in *Erica*.]—*Phytopath. Z.*, 30, 2, pp. 117–148, 9 fig., 1957. [English summary.]

The widespread and high mortality of *Erica gracilis* in Swiss nurseries is attributed in the first place to a disequilibrium in the root/shoot relation caused by N fertilizers, which at the same time inhibit the growth of beneficial mycorrhiza and promote that of *Olpidium* [*brassicae*: 36, p. 699] and an increasingly prevalent *Rhizophidium* sp. This is believed to be the first record of an *R.* species as a parasite on plant roots. While it is possible to prevent root dying by a reduction in N supply, the plants so treated are unsaleable on account of their precocity and the development of deficiency symptoms. Experiments on the chemical control of the above-mentioned fungi have so far yielded no tangible results.

OLSEN (C. M.) & AFANASIEV (M. M.). **Root rot of Sweet Peas.**—*Proc. Mont. Acad. Sci.*, 16, pp. 37–38, 1956. [Received 1957.]

A root rot of sweet peas has become prevalent in Bozeman, Montana. The plants grow normally at first, but when in bloom yellowing occurs, followed by necrosis of the vascular tissues and complete drying up of the plant. In 12 resident-owned plots pre-planting applications of CBP (chlorobromopropene) at 1.5 ml./hole spaced 1 ft. apart, and vapam 4-S at 1,520 ml./100 sq. ft., diluted in water and sprinkled on top of the soil, both followed by a water seal, gave 70.1 and 72.7% healthy plants, respectively, compared with 58.9 and 39.8% in the untreated plots. All the 22 isolates from diseased plants proved to be *Fusarium* spp. [cf. 30, p. 416].

BHARGAVA (K. S.) & BIST (N. S.). **Three virus diseases of hill fruits in Kumaon.**—*Curr. Sci.*, 26, 10, pp. 324–325, 3 fig., 1957.

The authors report from the D.S.B. Government College, Naini Tal, India, virus-like symptoms on a number of varieties of temperate fruit trees. The following viruses were transmitted to seedlings by budding: plum line pattern from plums, apple mosaic virus (a severe and a mild strain were observed) from apples, and peach necrotic leaf spot virus from peach. These are the first records of these diseases in India.

Jaarverslag 1956 Proefstation voor de Fruitteelt in de volle grond. [Report for 1956 of the Experiment Station for Outdoor Fruit Culture.]—87 pp., 12 fig., 5 diag., 9 graphs, 1957. [English summary.]

In the mycological section (pp. 37–46) of this report [cf. 36, p. 329] G. S. ROOSJE

describes the results of further studies on the applicability of the Mills and Lap-lante spray-timing method to the control of apple and pear scab (*Venturia inaequalis* and *V. pirina*) in the Netherlands [37, p. 171]. From the outcome of inoculation experiments with conidia of *V. inaequalis* it appeared that the minimum wetting time requisite for infection at 6.7–8.6° C. would be some hours longer than the period indicated by the American workers for ascospore infection. After 3 hr. immersion in water conidia were capable of surviving at least 11½ hr. on the leaves at R.H. 95%; after 3½ hr. immersion the period was 7–8 hr. at R.H. 77%. In 8 comparative tests the incubation period for fruit infection was very variable but longer than for leaves. In laboratory trials the curative action of 0.1% tuzet approximated to that of nirit 45. In a field experiment on Jonathan and Golden Delicious tuzet induced marginal sinuosities and discolorations of the leaves at the shoot tips, but the anomalies were not regarded as serious.

Contrary to the results obtained in 1954, *V. pirina* was more effectively combated in the field by captan than by A Azira (containing 0.15% ziram).

The first apple mildew (*Podosphaera leucotricha*) lesions were observed on 24 May. Infection may occur when the max. temp. is 13–17°. The disease was as well controlled on Jonathan and Golden Delicious by a commercial mixture of thiovit and captan SM 55 and by home-made and commercial mixtures of thiovit and A Apirol 80 (thiram) as by thiovit alone at a higher concentration, while karathane WD at 0.1–0.12% also proved as effective as thiovit at 0.4–0.5%.

The co-operation of Dr. [J. G.] Ten Houten was sought in connexion with studies on a number of problems relating to the biology and control of *Phytophthora* spp. in the orchard. On potato dextrose agar captan and zineb exerted a much stronger inhibitory effect than ziram on the growth of *P. cactorum* [35, p. 103]. In the autumn of 1956 *P. syringae* [35, p. 104] was isolated from Cox's Orange Pippin, James Grieve, and Jonathan apples that had rotted on the trees in many localities, sometimes on a considerable scale. An isolate of *P. sp.* from pear was pathogenic to apple and vice versa. Both *P. cactorum* and *P. syringae* could be isolated from the soil of an orchard with collar rot.

ANDES (J. O.) & EPPS (J. M.). **Evaluation of fungicides for control of fruit diseases.**

—*Bull. Tenn. agric. Exp. Sta.* 254, 15 pp., 1956. [Received 1957.]

The results are summarized of tests during 1950–55 near Jackson, Tennessee, to compare the performance of some fungicides against fruit diseases; applications began with the 2nd cover. Apple blossom blight [*Sclerotinia laxa*] and cedar rust (*Gymnosporangium juniperi-virginianae*) are of major importance in the State, scab (*Venturia inaequalis*), frog-eye (*Physalospora obtusa*) [35, p. 23], and bitter rot (*Glomerella cingulata*) varying in severity [12, p. 100]. Captan (2 lb.), organic mercury, and glyodin (1 qt.) gave the best control of scab and frog-eye. Zineb and sulphur-ferbam were less reliable but reduced infection significantly. Captan provided the best finish but was not satisfactory against cedar rust, ferbam and zineb being superior [cf. 37, p. 46]. Applications of zineb during blossoming, when other fungicides were restricted, reduced the rust considerably. Blossom blight was greatly reduced by streptomycin, 1:3:50 Bordeaux, and to a lesser extent by zineb.

BOSCH (E.). **Untersuchungen über die Ursachen der Berostungen auf der Fruchtschale der Äpfel.** [Studies on the causes of russetting of Apple skin.]—*Phytopath. Z.*, 30, 4, pp. 429–448, 4 fig., 1957.

At the Siegfried AG. Abt. Schädlinge-bekämpfung, Zofingen, Switzerland, 0.1% emulsions of the phosphorus compounds parathion, malathion, and diazinon sprayed without admixture on Golden Delicious apples caused typical ring russeting [cf. 35, p. 529]; suspensions of parahtion (0.15%) and diazinon (0.1%) also

had a detrimental effect. Combinations of 0.2% organol N (zineb) and 0.3% sporex (containing glyodin) with phosphorus compounds on Golden Delicious, Starking, and other varieties may intensify a slight russetting, typical for these, or even produce new russetting of different appearance. Organic fungicides sprayed without admixture may also produce russetting or only irritations of the peel.

Sporex and organol N without admixture did not russet Golden Delicious or Starking, neither did the combinations of these with lead arsenate; on the contrary, they inhibited injury. A suspension of malathion did not produce any detrimental effect.

BYRDE (R. J. W.). **The varietal resistance of fruits to brown rot. II. The nature of resistance in some varieties of cider Apple.**—*J. hort. Sci.*, **32**, 4, pp. 227–238, 1957.

In a fuller investigation of resistance to *Sclerotinia fructigena* in cider apples at Long Ashton Research Station, Bristol [**35**, p. 777], the bitter-sweet vars. Chisel Jersey, Dabinett, and Yarlington Mill exhibited, throughout the period July–Nov., a resistance to spore infection of surface wounds on the fruit which was partially correlated with the browning of the injured tissue and the firmness of the flesh. Treatment of injured tissue of Yarlington Mill with 0.062 M glutathione prevented browning and also reduced resistance. Oxidized fruit juice (Chisel Jersey) was not fungistatic to germinating spores.

The macerating (pectolytic) activity of culture filtrates of *S. fructigena* on cucumber disks was markedly reduced by overnight incubation (25° C.) with oxidized juice of Yarlington Mill but only slightly by that of the susceptible var. Laxton's Superb [cf. **35**, p. 385].

It seems highly probable that the resistance of certain high-tannin apple varieties is derived, at least partly, from the presence in the injured tissues of oxidized polyphenols, probably of high mol. wt, which inhibit the macerating enzymes.

ADAMS (R. E.) & TAMBURRO (S. E.). **The West Virginia spot-rot complex of Apple in 1956.**—*Plant Dis. Repr.*, **41**, 9, pp. 760–765, 1957.

At West Virginia University, Morgantown, representatives of 24 genera of fungi and several bacteria were isolated from lesions of unknown etiology on apple fruits. Only *Sordaria fimicola*, *Trichoderma viride*, and the bacteria proved non-pathogenic when wound-inoculated. It was difficult to differentiate between the symptoms of *Botryosphaeria ribis*, black rot (*Sphaeropsis malorum*) [*Physalospora obtusa*], and *Nigrospora sphaerica*. Species producing spots or rots were *N. sphaerica*, *Chaetomium* spp., *Melanconium fuligineum*, and *Hypoxyylon mediterraneum*. Fewer lesions were found on Red Delicious than on other varieties, growers having taken exceptional care in spraying and picking because of the higher value of the fruit.

GOVI (G.). **Maculatura parassitaria delle foglie di Melo.** [Parasitic spotting of Apple leaves.]—*Ital. agric.*, **94**, 7, pp. 630–632, 4 fig., 1957.

The symptoms of apple leaf spot (*Phyllosticta prunicola*), which has become fairly widespread and severe in the provinces of Emilia and Rome of recent years [**32**, p. 423], and the biology of the causal organism are briefly described.

HALL (E. G.). **Control of Apple scald.**—*Food Pres. Quart.*, **17**, 1, pp. 2–6, 1 fig., 1957.

In an address to the Australian Apple and Pear Growers' Association at Bathurst, N.S.W., 8–9 Aug. 1956, the author reviewed the factors affecting and control of apple scald [**35**, p. 104; **36**, p. 682]. If the weather during the last 6 weeks before harvest is cool with little sunshine, scald in storage is unlikely. Granny Smith

apples picked in the 3rd week of Apr. develop a minimum of scald, picking a week earlier or later increasing the disorder. Exposure of the fruit during storage to the vapour of commercial hexane inhibits it.

Low storage temperatures delay scald and maintain better colour, firmness, and flavour. Granny Smith should be placed in storage as soon as possible at 30° F. wrapped in oiled paper containing at least 15% refined mineral oil. Under N.S.W. conditions wrapping can be delayed for up to 6 weeks without serious risk of affecting control.

POSNETTE (A. F.) & ELLENBERGER (CHRISTINA E.). **Bark-split—a virus disease of Plums.**—*Ann. appl. Biol.*, **45**, 4, pp. 573–579, 1 pl., 1957.

The first external symptoms of bark split virus disease of plums [35, p. 875] are reddish-brown areas on the bark, which become sunken, dark, and usually split. The splits increase and are generally flanked by sunken areas of dead bark with wavy margins. The necrosis may reach the cambium, and if large areas are affected the trunk or a main branch may be killed. The initial dead area of bark is cut off by a secondary phellogen, successive layers of phellogen following. The initiation of the bark canker appears to follow a breakdown of cells in the adjoining medullary ray. The final effect resembles repeated attacks of bacterial canker [*Pseudomonas mors-prunorum*], but bark split virus causes progressive cankers.

In transmission experiments at East Malling Research Station the virus was transmitted by grafting in the dormant season, but was rarely transmitted or scion-perpetuated by budding. About 90% of Common Plum clonal rootstocks at the Station were found to be infected. Apparently virus-free Common Plum was propagated by root cuttings from Common Plum stock under normal Cambridge Gage trees.

A somewhat different type of bark split disease, but with similar leaf symptoms, developed on Shiro plum, which is nonsensitive to the Common plum bark split, when it was inoculated with virus from a Quetsche Précoce de Zimmer tree with symptoms resembling [plum] line pattern virus. This bark split differed in being readily transmitted by summer budding and in affecting the bark of young shoots before older ones. The paper concludes with a comparison of bark split virus disease and prune diamond canker virus in California [21, p. 83], obvious differences being indicated. Except in a few varieties, such as Cambridge Gage, bark split virus appears to cause little damage. So far, it has been found only on Cambridge Gage (severe), Ontario, Ouillin's Golden Gage (both mild), Victoria (small areas of dead bark), and Lombard, all on Common Plum stocks.

PICCO (D.) & SCARAMUZZI (G.). **Una variegatura virussimile delle foglie di Ciliegio.** [A virus-like variegation of Cherry leaves.]—*Phytopath. Z.*, **30**, 2, pp. 181–188, 4 fig., 1957. [English and German summaries.]

An irregular leaf variegation of Bigarreau Moreau cherry in a nursery at Rocca-bianca, Parma, Italy, in June, 1955, was characterized by the development of more or less extensive areas of pale green shading off abruptly into a still lighter tone and then into a creamy-white of varying depth. The mottling was very often accompanied by malformation. The percentage of variegated trees was estimated at 20–80. In budding and grafting experiments on cherry seedlings and Scanarda plums typical symptoms were present only on the scions. The condition [cf. 37, p. 95], presumably resulting from bud mutation, is believed to be identical with non-transmissible or non-infectious variegation [34, pp. 230, 305], white crinkle [cf. 36, p. 8] (according to a verbal communication from L. C. Cochran), and marbling [33, p. 591]. Notwithstanding the apparently non-infectious character of the defect, growers should be warned against the use of affected scions since they are likely to give rise to comparatively weakly, unproductive, and short-lived trees.

LABRUYÈRE. (R. E.). **Enkele waarnemingen over de schimmel *Elsinoë veneta* (Burkh.) Jenk., de perfecte vorm van *Sphaceloma necator* (Ell. & Ev.) Jenk. & Shear, op Framboos.** [Some observations on the fungus *Elsinoë veneta* (Burkh.) Jenk., the perfect state of *Sphaceloma necator* (Ell. & Ev.) Jenk. & Shear, on Raspberry.]—*Tijdschr. PlZiekt.*, **63**, 3, pp. 153–158, 8 fig., 1957. [English summary.]

From a study of the literature the author concludes that the imperfect state of *Elsinoë veneta* should be designated *Sphaceloma necator* [cf. **26**, p. 160]. Until recently *E. veneta* was known in the Netherlands only in the imperfect state, but in 1956 asci were detected on raspberry canes from Wageningen and Breda. An unusual type of infection, in the form of superficial lesions with mycelial permeation of the cortical parenchyma and collenchyma but no canker development, is briefly described. In varietal reaction trials from 1954–56 Malling Promise, Malling Enterprise, Preussen, and Radboud were seldom attacked, whereas Lloyd George and Gertrudis were rarely free from infection.

Although the damage caused by *E. veneta* is relatively inconsiderable in itself, it may be aggravated by subsequent attack of wound parasites. A substantial reduction can be achieved by cultural methods, including wide spacing, systematic pruning, and destruction of severely infected shoots and dead material.

STRUBLE (F. B.) & MORRISON (L. S.). **Blackberry anthracnose control and its relation to yield.**—*Plant Dis. Repr.*, **41**, 9, pp. 766–769, 1957.

At Oklahoma Agricultural Experiment Station, Stillwater, blackberry anthracnose (*Elsinoë veneta*) was controlled by a single delayed dormant spray (such as Bordeaux 8:8:100) but neither yield nor fruit size was increased as a result of control.

FRAZIER (N. W.) & POSNETTE (A. F.). **Transmission and host-range studies of Strawberry green-petal virus.**—*Ann. appl. Biol.*, **45**, 4, pp. 580–588, 2 pl., 1957.

In studies at East Malling Research Station a virus causing phyllody (virescence) in clover flowers was transferred through *Cuscuta subinclusa* and *C. campestris* to *Fragaria vesca* and *Duchesnia indica*, which then developed symptoms of strawberry green petal virus [**37**, p. 132]. The jassid *Euscelis plebejus* in several forms (including the ? syn. *E. lineolatus*, *E. galiberti*, and *E. bilobatus*) transmitted green petal virus from clover to clover, to and from a wide range of other hosts, and from but not to strawberry. Two viruses (or strains) were found in clover, one causing phyllody and the other witches' broom; both were retained for over 2 months by the vector, in which both had a latent period of about 30 days.

Variation in symptoms on strawberry infected naturally and experimentally by dodder suggested that two diseases have hitherto been grouped under the name 'green petal', which are now distinguished as green petal, caused by the virus inducing phyllody in clover, and bronze leaf wilt, induced by the virus causing witches' broom in clover. The original hypothesis relating green petal to aster yellows virus [**35**, p. 689] is neither proved nor disproved; insufficient is known of the characteristics of the viruses that cause phyllody and witches' broom on clover and of their significance in relation to strawberry green petal. They appear to bear a general similarity to aster yellows virus in host range, symptoms, vectors, and virus-vector relationships, but they are not identical with any described North American strain of aster yellows virus, differing in incubation period, host susceptibility, and symptom picture.

COX (R. S.) & WINFREE (J. P.). **Observations on the effect of fungicides on grey mold and leafspot and on the chemical composition of Strawberry plant tissues.**—*Plant Dis. Repr.*, **41**, 9, pp. 755–759, 1957.

In field trials at the University of Florida, Belle Glade, parzate (2 lb./100 gal.) and

nabam-zinc sulphate (2 quarts) gave the best control of *Mycosphaerella fragariae* on Florida-90 strawberries but both increased infection by *Botrytis cinerea* [cf. **36**, p. 359]. Zn accumulation was up to 10× greater in sprayed plants than in the untreated or in those receiving other fungicides. Phygon (3-4 lb.) provided the best control of *B. cinerea*, thylate (1½ lb.) and dyrene (50% 2,4 dichloro-6-(o-chloroanilino) triazine: 2 lb.) being almost as effective. Phygon caused severe stunting; dyrene slight leaf bronzing and some stunting.

TEAKLE (D. S.). **A Lucerne root rot caused by *Pythium myriotylum*.**—*Qd J. agric. Sci.*, **13**, 4, pp. 241-243, 1 fig., 1956. [Received Sept. 1957.]

In S.E. Queensland *P. myriotylum* was found associated with a root rot of lucerne seedlings which resulted in a general unthriftness of the plants, chlorosis, and progressive defoliation. The fungus proved strongly pathogenic to lucerne seedlings in laboratory inoculation tests, but field attack appeared to be related to the nutrient status of the soil. The initial outbreak in 1954, resulting in some 100% loss within 4 months, was on a ¼-acre plot of virgin soil with much decomposing vegetable matter. In 1955 on similar soil, well prepared, only a few plants appeared unthrifty after a year.

GOLENIA (A.). **Rdza Mięty (*Puccinia menthae* Pers.) w warunkach centralnej Polski.** [Mint rust (*Puccinia menthae* Pers.) in central Poland.]—*Biul. Państw. Inst. Nauk. Les. Surow. Roś. Poznań.*, **3**, 2 (10), 8 pp., 5 fig., 1957. [Russian and German summaries.]

Research on mint rust (*Puccinia menthae*) in central Poland has resulted in new findings concerning the morphology of the fungus and the symptoms of the disease. When spring is early the spermatogonia appear at the beginning of April, and the aecidia mature in the second half, but with a late spring these are delayed until the beginning and later part of May, respectively. Details are given of the peculiar development of the teleutospores observed in Poland.

ANSELME (C.) & BALZAKIS (N.). **Sur une pourriture de Dattes de conservation provoquée par *Mauginiella scaetiae* Cav.** [On a rotting of preserved Dates caused by *Mauginiella scaetiae* Cav.]—*Ann. Épiphyt.*, **8**, 2, pp. 153-164, 9 fig., 1957.

In the winter of 1954-5 the authors received at the Station Centrale de Pathologie Végétale, Versailles, boxes of dates prepared for sale in France in which most of the fruits were attacked by *M. scaetiae* [**9**, p. 239; **35**, p. 605; *et passim*], infection evidently having spread from inflorescences on the piece of spadix placed in the box. Steeping the spadices in 95% alcohol for 15 min. is recommended, the treatment having killed the fungus in agar culture.

BRANDES (J.). **Eine elektronenmikroskopische Schnellmethode zum Nachweis faden- und stäbchenförmiger Viren, insbesondere in Kartoffeldunkelkeimen.** [A rapid electron-microscope method for the demonstration of filamentous and rod-shaped viruses, especially in Potato sprouts developed in the dark.]—*Nachrbl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **9**, 10, pp. 151-152, 3 fig., 1957.

From the Biologische Bundesanstalt, Institut für Landwirtschaftliche Virusforschung, Brunswick, the author briefly refers to a 'dip method' by which virus is obtained from a cut leaf blade by placing the cut for a moment in contact with a drop of water on a slide. This gives samples comparable with those obtained by Johnson's exudate method [cf. **36**, p. 78] and is especially suitable where exudates are difficult to obtain. With sprouts (2-10 mm. long) from potato tubers germinated in the dark good samples of potato viruses X, Y, and S [strain of potato para-

crinkle virus] were obtained when the base of the sprout was cut off and the cut surface of the upper part placed for 1-2 sec. in contact with the water drop.

GEHRING (F.). **Über ein Auftreten des Stengelbuntvirus der Kartoffel in Deutschland.** [On an occurrence of Potato stem mottle virus in Germany.]—*NachrBl. dtsh. PflSchDienst (Braunschweig), Stuttgart*, **9**, 11, pp. 172-175, 7 fig., 1957.

At the Institut für Virusserologie, Brunswick, necrotic flecks, line patterns, and rings on a plant of the potato var. Saskia were found by inoculation to tobacco to be caused by potato stem mottle virus; reinoculation of Saskia plants by *Cuscuta campestris* [cf. **35**, p. 580] reproduced the original symptoms.

NOORDAM (D.). **Tabaksnecrosevirus in samenhang met een oppervlakkige aantasting van Aardappelknollen.** [Tobacco necrosis virus in association with a superficial infection of Potato tubers.]—*Tijdschr. PlZiekt.*, **63**, 5, pp. 237-241, 1957. [English summary.]

A disorder of Duke of York potato tubers which has been known in the Netherlands since 1924 is characterized by three types of symptoms, designated A, B, and C, giving rise to the name of 'ABC disease' (*Versl. PlZiekt. Dienst Wageningen*, 124 (1953), pp. 16-17, 1954). On the skin of freshly lifted tubers are circular or band-like, dark brown, superficial lesions up to 1 cm. diam. with stellate or reticulate cracks, somewhat resembling those of scab [*Streptomyces scabies*] but surrounded by paler zones without fissures. There are also light brown lesions of the same size as the dark ones, with or without inconspicuous cracks. In storage the zones surrounding the star-shaped lesions and the paler spots turn darker brown. Blisters, sometimes already present on lifting, develop into sunken areas which may involve a large part of the tuber. Similar but more pronounced symptoms occur on Red Duke of York. On Bintje the brown lesions with reticulate cracks are not invariably surrounded by a brown zone without fissures. Watersoaked spots, hardly darker than the skin, were also observed. After some months of storage a brown, necrotic, non-reticulate zone develops round the lesions, thereby differentiating them from those due to scab. Doré reacts similarly to Bintje, but without watersoaking.

A virus identified as tobacco necrosis virus from the lesions formed on White Burley tobacco and a positive precipitin reaction with antiserum against a strain of the Rothamsted group of tobacco necrosis viruses was detected in diseased tissues. Reproduction of the symptoms in Duke of York potato tubers has so far been unsuccessful, but the implication of the virus in the etiology of 'ABC' disease is suggested by its invariable presence in the affected portions of the tubers and its absence from the healthy ones. The virus was also detected in the sunken spots on Duke of York tubers and in the roots.

In the Netherlands tobacco necrosis virus has also been found (unpublished data) in *Bowardia*, *Primula obconica*, and strawberry.

GEDZ (S. M.). Значение вегетативной гибридизации для повышения иммунитета Картофеля к раку *Synchytrium endobioticum* (Schilb.) Perc. [The importance of vegetative hybridization for increasing immunity of Potatoes to wart disease *Synchytrium endobioticum* (Schilb.) Perc.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.*], **22**, 9, pp. 28-30, 1957.

In field and laboratory trials from 1951-56, inclusive, at the University of Chernovitz, U.S.S.R., potato varieties resistant to wart disease [**36**, p. 120 and below] were grafted to susceptible varieties, using eyes, roots, and shoots. If the grafting material was treated for 5-6 days with 0.0005% heteroauxin solution in cotton wool the results were very satisfactory. Following laboratory tests and the establishment of grafted plants, trials in highly infected fields are in progress. The first,

second, and third generations of some combinations proved completely resistant; for example, with Majestic, Ubel, and Carnea on Seyanez 20, Seyanez 112, and Alma, respectively, no disease appeared at all [but see 3, p. 234].

FEDOTOVA (Мме Т. И.), KARASEVA (Мме Е. Ф.), & RAKOVICH (М. И.). Различия в активности у возбудителя рака Картофеля. [The difference in the activities of the causal organism of Potato wart disease.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.*], 22, 9, pp. 31–33, 1957.

At the State Scientific Research Institute for Plant Protection in U.S.S.R. observations have established the existence of 47 potato varieties resistant to wart disease (*Synchytrium endobioticum*) [36, p. 55 and above]. The greater virulence of isolates from some districts, such as Chernovitz and Minsk, indicates the existence of a new strain of the fungus. Testing was carried out by inoculation and by the laboratory test adopted in U.S.S.R. for estimating resistance to wart disease.

HOWATT (J. L.). **The late blight disease of Potatoes and its causal fungus in Canada.**—*Amer. Potato J.*, 34, 7, pp. 185–192, 1957.

A survey carried out by the Botany and Plant Pathology Division, Canada Dept of Agric., Ottawa, from 1954–56, of the distribution of the physiological races of *Phytophthora infestans* in Canada [35, p. 217; 36, p. 661] was based on examination of infected foliage, potato tubers, and tomato fruits received. The disease is still relatively unimportant in Saskatchewan and Alberta, but may on occasion be troublesome in all provinces.

Of the 14 races found in 9 provinces race 4 was the commonest and 1,4 was widely distributed. Eastern Canada had the greatest number of races and the more complex races, while the fungus was poorly represented in the Prairie Provinces.

The international potato genotypes could not always be relied upon to register the correct race in one determination, and certain races often behaved erratically on specific genotypes [cf. 35, p. 318].

WOLF (F. A.). **Notes on Tobacco diseases and disorders in Venezuela.**—*Tobacco*, N. Y., 145, 2, pp. 20–21, 1957. (Reprinted in *Tobacco Sci.*, 1, pp. 103–104, 1957.)

The commonest and most destructive tobacco virus disease in Venezuela is leaf curl [map 147]. Flue-cured varieties developed in Virginia or N. and S. Carolina for resistance to *Phytophthora parasitica* var. *nicotianae* are found to exhibit almost perfect resistance to or tolerance of the fungus in Venezuela. Tobacco streak virus, not hitherto reported in Venezuela, was found to be present in Burley fields everywhere, but only on occasional, widely-separated plants and was nowhere of economic importance. Frogeye (*Cercospora apii*) [*C. nicotianae*: map 172] was fairly prevalent on Burley tobacco in the Guarico valley below Carnatagua, Edo. Aragua, where dews and gentle winds prevailed. Where the ground was quite level the disease was almost entirely absent. *Macrophomina phaseoli* [34, p. 352] was noted in epiphytotic proportions in two widely separated areas where the fields had been cropped during the previous rainy season with beans [*Phaseolus*]. Brown spot (*Alternaria longipes*) [map 63] is widespread and frequent; incidence is reduced by the liberal application of K.

OWEN (P. C.). **The effects of infection with Tobacco mosaic virus on the photosynthesis of Tobacco leaves.**—*Ann. appl. Biol.*, 45, 3, pp. 456–461, 1 graph, 1957.

In further work at Rothamsted Experimental Station the rate of photosynthesis of White Burley tobacco leaves experimentally inoculated with the Rothamsted type culture of tobacco mosaic virus [cf. 36, p. 734] was lower than that of comparable healthy leaves, the effect becoming noticeable within one hour of inoculation,

long before any macroscopic symptoms were visible and many hours before any multiplication of the virus was detectable. Exposure of inoculated leaves to ultra-violet radiation at different times after inoculation indicated that mechanical inoculation affects mainly, if not exclusively, the epidermal cells; as these are not concerned with photosynthesis, the presence of virus particles in them would seem to influence the still uninfected chlorenchyma. But even if some of the chlorenchyma cells do become infected, it would be necessary to postulate effects on the photosynthesis of adjacent cells to account for the considerable change. If the effect is attributed to virus action at a distance, the respiration effect [35, p. 128] may also involve cells other than those containing virus.

The decrease in rate of photosynthesis was not due to any effect of the virus on the stomata, nor did inactivated inoculum change the rate. The results are therefore considered to indicate either a more rapid movement of virus from the epidermis into the chlorenchyma than has previously been recorded, or an effect of virus infection at a site remote from the cells containing virus.

The only known meeting-points of photosynthesis and respiration are in the end-products, carbon dioxide, oxygen, and sugars. Simultaneous effects on respiration and photosynthesis of chlorophyllous cells may indicate a general change in the cell metabolism rather than a specific effect on one aspect.

SHIMOMURA (T.) & HIRAI (T.). **Nature of virus infection in plants. (VI) The incorporation of P^{32} into host cells and Tobacco mosaic virus nucleic acid.**—*Forsch. PflKr., Kyoto*, **6**, 2, pp. 73–79, 1 fig., 1956. [Japanese. Abs. from English summary. Received 1957.]

At Nagoya University, Anzyo, Japan, tobacco half-leaves uninoculated and inoculated with tobacco mosaic virus were floated for 6–7 days in water containing P^{32} . Subsequent analysis showed that the P content and specific radioactivity in the nucleic acid fraction of the inoculated halves exceeded that in the uninoculated; the data suggested that 50–80% was derived from the tobacco mosaic virus nucleic acid [cf. 36, p. 136], which is possibly synthesized *de novo*. There was no clear distinction between the organic P content of inoculated and uninoculated leaves.

Autoradiographs indicated that nuclei and chloroplasts, especially the disintegrated chloroplasts of infected leaves, incorporate more isotopes than uninfected leaves, and the chloroplasts may therefore be associated with virus biosynthesis.

YAMAGUCHI (A.). **Nature of virus infection in plants. (VII) Intracellular localization of succinic oxidase activity in the virus-infected tissues.**—*Forsch. PflKr., Kyoto*, **6**, 2, pp. 81–86, 10 graphs, 1956. [Japanese. Abs. from English summary. Received 1957.]

In further work in this series [cf. above] the results are presented of observations on particulate fractions of virus-infected leaf homogenates, intracellular localization of succinic oxidase activity being studied by the cell fractionation technique.

BRČÁK (J.). **Änderungen der Infektiosität des Tabakmosaikvirus während der Passage durch den Darm von *Barathra brassicae* (L.).** [Changes in the infectivity of Tobacco mosaic virus during its passage through the intestine of *Barathra brassicae* (L.).]—*Phytopath. Z.*, **30**, 4, pp. 415–428, 2 figs., 1957.

In tests at the Phytopathological Dept of the Czechoslovak Academy of Sciences, Prague-Dejvice, tobacco mosaic virus [32, p. 232] did not lose its infectivity during passage through *B. brassicae* caterpillars fed on infected *Nicotiana glutinosa* leaves. In caterpillars of *Mamestra oleracea* fed on beet leaves infected by beet mosaic virus there was no active virus.

Incomplete mastication of the leaves may be a significant factor.

COLE (J. S.). **Some control measures for anthracnose disease of Tobacco.**—*Ann. appl. Biol.*, **45**, 3, pp. 542–549, 1957.

In seed-bed trials conducted by the Tobacco Research Board of Rhodesia and Nyasaland, Salisbury, Southern Rhodesia, the best control of tobacco anthracnose (*Colletotrichum tabacum*) [37, p. 185] was secured by spraying. Commercial preparations containing maneb at 0.09 and 0.17% or thiram at 0.12 and 0.24% gave excellent control, infection indices in Dec. for plants sown 6 Sept. being 0.4, 0.6, 2, and 0, respectively, as against 38.2 for the untreated, and for 17 Oct. sowing 0.4, 0.7, 1.6, and 0.7, respectively, as against 67.5. Commercial zineb at 0.2% and captan at 0.1% also gave good control, though at lower rates the infection indices were high. In the late-sown experiment there was evidence of a synergistic reaction between zineb and Bordeaux; mixed they gave better control than either alone, but were phytotoxic.

Early in the season, in hot, dry weather, the fungus can establish itself on young seedlings, though spread is generally limited, but during periods of rain and overcast weather the disease probably spreads rapidly from these foci of infection. Seedbeds shaded with a light cloth suffered more severely from the disease than those covered with a thin grass mulch.

WOLF (F. A.) & FLOWERS (J. M.). **Tobacco anthracnose and toxin production.**—*Tobacco*, N.Y., **144**, 26, pp. 26–31, 1957. (Reprinted in *Tobacco Sci.*, **1**, pp. 93–98, 1957.)

At Duke University, Durham, N. Carolina, culture filtrates of *Colletotrichum nicotianae* [20, p. 317; cf. 36, p. 357] from Burley, flue-cured, and Maryland tobaccos were sterilized by passage through a bacterial filter. Anthracnose symptoms developed in leaves with petioles in the sterile filtrates, thereby demonstrating the formation by the isolates of a toxin connected with the disease. It had 2 components, one thermostable and inducing necrosis, the other thermolabile and dialysable, causing wilt. Both elements proved soluble in alcohol and ether and could be permanently adsorbed on Dowex anion-exchange resins. The 1st is not a polysaccharide or a protein, nor is the 2nd a protein.

PREUSS (HELGE). **Untersuchungen zur Ökologie und Bedeutung der Tabakmykorrhiza.** [Studies on the ecology and significance of Tobacco mycorrhiza.]—*Naturwissenschaften*, **44**, 22, p. 592, 1957.

In both a sandy loam soil with admixtures of turf or spruce litter and Knop's solution tobacco plants inoculated by a special implantation method with endotrophic mycorrhiza developed better than untreated in experiments at the Botanische Abteilung Madaus, Köln-Merheim, Germany. The fungus forms typical coils, the non-septate hyphae within the plant swelling to twice their original size and spreading through the root until the entire primary cortex is filled with hyphae, arbuscules, and vesicles of 4 distinct types. Root infection may be accomplished by means of either mycelium from root debris or germinating vesicles, the latter being probably the more common in nature. The incidence of infection reaches a maximum during the spring and summer.

CICCARONE (A.), CECI (D.), VERNEAU (R.), & ROSA (M.). **Appunti fitopatologici sul Pomodoro per l'anno 1956.** [Phytopathological notes on the Tomato for the year 1956.]—*Industr. ital. Cons. aliment.*, **32**, 1, pp. 3–11, 13 fig., 2 graphs, 1957.

In Emilia a severe outbreak of *Phytophthora infestans* [35, p. 748] occurred. Next in importance in northern Italy was *Septoria lycopersici* [cf. 33, pp. 437, 567], followed by *Alternaria solani* [35, p. 508] and *Phoma destructiva* [34, p. 755]. Symptoms of *Phytophthora parasitica* were noted on the fruits. *Corynebacterium michiganense* [30, p. 393; 34, p. 407] was present on var. Pierrette near Parma on 21 July, apparently the first record of the organism in Italy north of Rome. *Xanthomonas*

vesicatoria [map 269] was commonly present on the leaves and fruits; on the latter it was associated with punctures caused by *Nezara viridula*. Tracheomycosis, associated with *Fusarium bulbigenum* var. *lycopersici* [cf. 36, p. 138], *Verticillium albo-atrum* [cf. 34, p. 346], and *V. dahliae* [cf. 34, p. 35], was more prevalent than usual round Parma and was general elsewhere.

In central and southern Italy, on the other hand, where the summer was hot and dry, *P. infestans* was not as predominant. *A. solani* was very damaging in the Sarno valley and the Pontine Marshes, but *X. vesicatoria* was, perhaps, less important than usual. *Phoma destructiva* occurred near Naples.

Tobacco mosaic virus [cf. 34, p. 618] was, as usual, widespread in the Sarno valley.

Apical rot [blossom end rot: 29, p. 587] was very serious, especially on the Marzano variety, in Emilia, Abruzzi, and Sicily.

STURGESS (O. W.). **Leaf shrivelling virus disease of the Tomato.**—*Qd J. agric. Sci.*, 13, 4, pp. 175–220, 15 fig., 2 graphs, 1956. [34 refs. Received Sept. 1957.]

Three virus diseases of tomato in S.E. Queensland are described. Tomato shrivel, prevalent from late autumn to spring, induces an etiolated and unthrifty appearance; leaf symptoms vary with the period since infection, temperature, and, to some extent, variety. Advanced winter symptoms are a diffuse leaf mottle of light- or yellow- or dark-green shades, rugosity of the leaflets, and downward recurving of the dwarfed leaves and leaflets. New leaves have a variable marginal leaf necrosis with an interveinal and veinal necrosis on the under surface. Shrivelling from below upwards is characteristic. The causal virus is a strain of potato virus Y [cf. 33, p. 187], transmitted by *Myzus persicae*, *Macrosiphum solanifolii*, and *Aphis gossypii* in this order of efficiency. Other weed hosts of the virus are *Solanum nigrum*, *Nicandra physaloides*, and *Physalis peruviana*; 9 other solanaceous species proved susceptible to inoculation. The disease may cause considerable reduction in yield. The results of the assessment of 23 tomato varieties, *Lycopersicon* species, and interspecific crosses are set out; no resistant or tolerant varieties were found, though 7 proved rather less susceptible than others.

Tomato yellow shrivel is due to a complex consisting of the above described strain of potato virus Y and the aucuba strain of tobacco mosaic virus [cf. 35, p. 49]. The varying symptoms consist in general of a bright yellowing of the leaves, interveinal puckering, downward recurving, and extensive basal shrivelling. An internal vascular and pith necrosis may cause stem collapse and wilting. Fruit-setting ceases after infection; ripening fruit may have yellowish blotches. The potato virus Y component is aphid transmitted, the second component entering from the soil, or by handling and other forms of contamination.

Tomato fern-leaf shrivel occurs in late winter and early spring, and apart from the lower leaf shrivelling resembles Mogendorff's tomato fern-leaf [9, p. 417]. It is caused by a complex of the above-mentioned strain of potato virus Y and cucumber mosaic virus, transmitted by the same aphid vectors. This disease is less widespread, but causes total loss of fruit in young plantings.

KERN (H.), SANWAL (B. D.), FLÜCK (V.), & KLUEPFEL (D.). **Die Verteilung der radioaktiven Fusarinsäure in Tomatensprossen.** [The distribution of radioactive fusaric acid in Tomato shoots.]—*Phytopath. Z.*, 30, 1, pp. 31–38, 3 fig., 1 diag., 1957. [English summary.]

At the Institut für spezielle Botanik, Zürich, C¹⁴ labelled fusaric acid [37, p. 22] was supplied to Tuckswood tomato cuttings for 1–2 hr., and the uptake studied by means of combustion and radioautography of thin sections. Immediately after uptake part of the toxin moves into the stem tissues and part into the interveinal areas of the leaves, the amount in the stem being larger at pH 4.3 of the solution

than at pH 7 and upwards but in the leaves there is more at pH 7. How the host cells are injured by the toxin is still unknown, though it has been ascertained that the acid itself is chemically modified—in part by decarboxylation and methylation and in part by means as yet undetermined. The level of fusaric acid necessary to produce visible necroses is higher for stems than for leaves; it was reached in stems only at the low pH but in the leaves throughout the experimental range.

During the next 48 hours (while the plants are standing in water), much of the toxin (more at pH 4.3 than at 6 and 7) migrates from the stem into the leaves. Its distribution and metabolic products at the end of the period no longer correspond to the symptom picture, indicating that the decisive reactions must have occurred at an earlier stage.

VOSKANYAN (S.). Устойчивость образцов Томата к септории и макроспориозу в условиях предгорий западной части северного Кавказа. [The resistance of Tomato varieties to septoriosiis and macrosporiosis in the conditions of the foothills of the western part of the north Caucasus.].—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.*], **22**, 7, pp. 25–29, 1957.

Experiments completed at the Maykops Experimental Station, Institute for Plant Breeding, U.S.S.R., on the resistance of tomato varieties to *Septoria lycopersici* [36, p. 623] and *Macrosporium* [*Alternaria*] *solani* in north Caucasus, led to the recommendation of the following varieties as resistant to both fungi: Dwarf Stone K-2/5, Dwarf Stone K-2/6, Beauty K-10/2, Trophy K-30/1, Trophy K-30/2, Trophy Gold Gelber K-30/7, Triumph K-30/8, and Stone Feodosiiski K-20/7. It is not certain that they are resistant elsewhere.

NOORDAM (D.), TERMOHLEN (G. P.), & THUNG (T. H.). **Kurkwortelverschijnselen van Tomaat, veroorzaakt door een steriel mycelium.** [Corky root symptoms on Tomato caused by a sterile mycelium.].—*Tijdschr. PlZiekt.*, **63**, 3, pp. 145–152, 3 fig., 1957. [English summary. 13 refs.]

At the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, Netherlands, sieving and centrifugation of dried ground roots of tomato plants affected by corky root or brown root rot [34, p. 68] yielded 7 fractions with different sedimentation rates. Only 3, viz. (1) the residue on the sieve, consisting of particles $> 50 \mu$, (2) sediment centrifuged for 1 min. at 1,000 r.p.m., and (3) the same for 5 min. at 1,800 r.p.m., contained fungus spores. From inoculation tests on *Nicotiana rustica* it appeared that a virus, probably tobacco mosaic, occurred in all the fractions but mostly in (1) and (6), the latter comprising sediment centrifuged in a Sharples 'clarifier bowl' at 40,000 r.p.m., 500 ml./60 min.

Each fraction was mixed with silver sand in paraffined pots, in which tomato seedlings were planted. After 13 weeks brown patches had developed on the roots grown with fractions (1) and (2), but none on plants in steamed silver sand. In a parallel test with steamed soil the roots were affected in much the same way. Infection seems to be produced by fractions little finer than 50μ . Of 8 fungi isolated from roots grown for a month in silver sand mixed with diseased root powder, only 1 proved capable of inducing symptoms resembling those arising from contact with corky root powder.

When plants were grown in steamed soil mixed with the infective fungus cultured on autoclaved tomato roots, extensive root rot developed and the cortex was loosened, frequently leaving only the central stele. New roots remained short and bushy and soon turned brown. Some of the larger roots developed the thickenings and corky 'rims' associated with natural infection. There were no secondary roots, usually numerous on healthy plants. In pots inoculated with only $\frac{1}{10}$ of the previous amount of the fungus more heavy roots with corky 'rims' were formed. The symptoms caused by the fungus, corky root powder, and contaminated soil were com-

parable, though with the last two the roots were darker, owing to the presence of *Colletotrichum atramentarium* [11, p. 767]. In one out of 6 pots without the fungus the roots were discoloured. The parasite was reisolated from 39 out of 65 root pieces grown in infested soil but not from roots in normal soil, whereas *C. atramentarium* developed from 20 of the former as well as from the latter. On cherry agar at 25° C. the corky-root fungus grows 5 times slower than *C. atramentarium*. Neither tobacco necrosis nor tobacco mosaic viruses could be detected either in the roots of the test plants or in the fungus itself.

The fungus is non-sporulating and so far unidentified. The mycelium is grey with black microsclerotia. Various workers have isolated sterile fungi from tomato roots, but only Richardson & Berkeley clearly demonstrated the causal relationship between such a fungus and the disease described [24, p. 78].

LINGLE (J. C.), HOLMBERG (D. M.), & ZOBEL (M. P.). **Zinc deficiency of Tomatoes.**—*Calif. Agric.*, **11**, 9, pp. 10–11, 2 fig., 1957.

At the University of California the first symptom in tomato plants [cf. 35, p. 486] seeded direct in Zn-deficient fields was acute stunting, the seedlings reaching only 2 in. in 2 months; the leaves were thickened, with marked yellowing round the margins and between the veins. In seedlings transplanted into these fields stunting was accompanied by an extreme reflexing of the leaves, which were again thickened and brittle. The new leaves appeared dusty; later the older leaves became orange- or bronze-coloured and small necrotic spots developed along the margins. Control was best achieved by watering in the transplants with ZnSO_4 (max. 2 lb./100 gal.), at no less than 500 gal./acre. Direct seeding on Zn deficient soils should be avoided.

BAZZIGHER (G.). **Über Anfälligkeit und Resistenz verschiedener Wirte von *Endothia parasitica*.** [On susceptibility and resistance in various hosts of *Endothia parasitica*.]—*Phytopath. Z.*, **30**, 1, pp. 17–30, 6 fig., 1957. [English summary.]

The callus frequently formed in chestnut tissues as a reaction to infection by *Endothia parasitica* [36, p. 796] is generally unable to arrest the advance of the pathogen. Cork barriers, however, are sometimes effective, as shown by cures of infected beech trees at the Eidgenössischen Anstalt für das forstliche Versuchswesen, Zürich [33, p. 569]. A healing tendency was also observed in chestnut lesions, but renewed attacks occurred in the cambial zone despite further cork formation. It was shown that tylose development may result from parasitism and toxin secretion.

E. parasitica is heterotrophic neither for aneurin [vitamin B_1] nor biotin but requires an as yet unidentified growth substance contained in yeast extract. The possibility that a difference in the amount of the latter may be decisive for the presence or absence of blight is suggested.

Moderately heavy infection (60–80%) was contracted by plants of the normally resistant *Castanea mollissima* treated with the following inhibitors of respiratory enzymes: acriflavine, thiourea, *o*-phenanthroline, sodium azide, 2,4-D (all at 1/1,000 M), hydroquinone, and pyrogallol (both at 1/100). A potential correlation between respiration and reaction to the fungus is accordingly postulated. The enhanced susceptibility of *C. mollissima* under outdoor conditions following the exceptionally severe winter of 1955–6 further indicates a possible adverse influence of cold on the respiratory mechanism.

WENT (JOHANNA C.). **Verslag van de onderzoeken over de lepenziekte en andere boomziekten, uitgevoerd op het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn, gedurende 1952 en 1953.** [Report of the investigations on the Elm disease and other tree diseases carried out at the Phytopathological Laboratory 'Willie Commelin Scholten', Baarn, in 1952 and

1953.]—*Meded. Inst. toegep. biol. Onderz. Nat.* 48, 12 pp., 1955. [English summary. Received Dec. 1957.]

It appears from this fully tabulated progress report on the results of inoculation experiments on elm seedlings and hybrids (5,100 in 1952 and 5,800 in 1953) with *Ophiostoma* [*Ceratocystis*] *ulmi* [34, p. 1] that the maximum degree of resistance was attained by using *Ulmus carpinifolia* No. 62 as a female and *U. carpinifolia* No. 1 as a male parent. The resistance of hybrids Nos. 125 and 248 (*U. hollandica vegeta* × *U. carpinifolia* No. 1 and *U. wallichiana* × *U. carpinifolia* No. 1) is confirmed, but both are susceptible to *Nectria cinnabarina* [37, p. 117].

BUTIN (H.). **Die blatt- und rindenbewohnenden Pilze der Pappel unter besonderer Berücksichtigung der Krankheitserreger.** [The leaf- and bark-inhabiting fungi of the Poplar, with special reference to the pathogens.]—*Mitt. biol. ZentAnst., Berl.* 91, 64 pp., 52 fig., 1957.

The information in this important monograph, devoted primarily to the fungi commonly encountered on poplars [37, p. 187] in Germany, is presented in the form of a critically annotated list, supplemented by selected references.

Among the parasitic species found on the foliage are *Taphrina aurea* [33, p. 509] and *T. johansonii* [34, p. 608], the latter confined to aspens (*Populus tremula* and *P. tremuloides*); *Melampsora* spp. [25, p. 145]; *Phyllosticta populina* [cf. 17, p. 728] forming dark brown spots, later whitish, on the upper leaf surface, especially of balsam poplars (sect. *Tacamahaca*), commonly in association with *Phyllocnistis* larvae; *Sphaerella* [*Mycosphaerella*] *populi*, developing in the spring of the year following infection [cf. 23, p. 365], on black and balsam poplars; *S. [M.] populicola*, more rare; *Septotinia populiperda* [33, p. 509], found occasionally in nurseries; *Trochila* [*Pseudopeziza*] *populorum*, on the upper surface of *Populus nigra*, *P. alba*, and *P. canescens* leaves; *Botrytis cinerea*, a wound parasite of various species; *Cladosporium epiphyllum*, a ubiquitous facultative parasite on all species; *Venturia populina*, observed in Germany only on *Populus nigra* and its hybrids; and *Pollaccia radiosa* [18, p. 639], widespread, particularly in nurseries, on *P. tremula*, *P. alba* and its var. *bolleana*, and *P. canescens*.

Comparatively few of the bark fungi are parasitic. They include *Nectria galligena* [cf. 33, p. 509], *Cryptodiaporthe populea* [37, p. 188], *Valsa nivea*, which is probably restricted to susceptible species, such as aspen [35, p. 248], *Fenestella vestita*, the perfect state of *Dothiorella populea*, which may cause bursting and cracking of the bark, followed by canker formation, on 2 to 5 yr.-old trees injured by frost or *C. populea*; and *Phoma urens*, responsible for a severe outbreak of black spotting of the stem and lateral branches of 90 of 100 3-yr.-old trees in a nursery near Hann.-Münden in 1957, extending over 40–50 cm. in about half of them.

ARX (J. A. v.). **Über Fusicladium saliciperdu (All. et Tub.) Lind.** [On *Fusicladium saliciperdu* (All. & Tub.) Lind.]—*Tijdschr. PlZiekt.*, 63, 5, pp. 232–236, 4 fig., 1957. [English & Dutch summaries.]

The young leaves and growing tips of the shoots of *Salix americana*, which is extensively used for basket-making in the Netherlands, are subject to heavy damage from *Fusicladium saliciperdu*. The morphological characters of the fungus are considered to exclude it from the genus *Fusicladium* in the sense of Hughes [33, p. 384]. It is closely related to *Pollaccia radiosa* [19, p. 50] and is accordingly renamed *P. saliciperda* (All. & Tub.) Arx.

Cultural studies revealed no connexion between *P. saliciperda* and *Venturia chlorospora*, the perithecia of which were found on dead leaves of *S. americana* [cf. 28, p. 247; 33, p. 523; 34, p. 680]. On oatmeal agar *V. chlorospora* produced mature asci and ascospores but no conidia, whereas *P. saliciperda* gave rise exclusively to conidia.

GOTHE (H.). **Beobachtungen über Stockfäule in Schlitzer Lärchenbeständen. 2. Mitteilung.** [Observations on butt rot in the Larch stands of Schlitz. Note 2.] — *Forst u. Holz*, **12**, 5, pp. 70–74, 6 fig., 2 graphs, 1957.

A recapitulation of the results of previous studies on the butt rot of larches in Oberhessen, Germany, caused by *Trametes radiciperda* [*Fomes annosus*] or more rarely *Polyporus schweinitzii* [34, p. 6] is supplemented by a survey of more recent data (1952–56). Of 5,500 trees examined, 636 (11.6%) were diseased and some 55% of the stands in the area (7,000 ha.) were affected. Infection was most prevalent among the oldest trees (over 130 yr.) of the highest production class. The greater frequency of severe attacks on marginal trees points to the likelihood of root injury as a predisposing factor.

KÄÄRIK (AINO) & RENNERFELT (E.). **Investigations on the fungal flora of Spruce and Pine stumps.**—*Medd. SkogsForsknInst., Stockh.*, **47**, 7, 88 pp., 16 pl., 13 fig., 1 diag., 4 graphs, 1 map, 1957. [Swedish summary. 53 refs.]

Part I of this important, fully tabulated study comprises systematic descriptions of the following fungi isolated from sporophores and boring cores taken from spruce and/or pine stumps up to 5 yr. old in Sweden: *Corticium alutaceum* (pine only), *C. evolvens* [34, p. 620], *Grandinia farinacea*, *Trechispora* [*G.*] *brinkmannii* (*Mycologia*, **29**, pp. 686–706, 1937), *Coniophora arida*, *C. olivacea*, *Peniophora gigantea* [32, pp. 53, 520; 35, p. 58], *P. pithya* [35, p. 498] (spruce), *Stereum pini* (pine), *S. sanguinolentum*, *Polystictus abietinus* [26, p. 88], *Polyporus amorphus*, *P. borealis* [31, p. 353], *P. caesius* [32, p. 159] (pine), *P. circinatus* [35, pp. 134, 406] (spruce), *P. benzoinus* [33, p. 60] (spruce), *P. stipticus* (spruce) [33, p. 695], *Poria mollusca* (spruce), *Fomes pinicola*, *Trametes heteromorpha* [28, pp. 201, 441], *F. pini*, *T. serialis* [34, p. 558], and *Lenzites saepiaria*.

The authors state that the cultural characters of *Polyporus stipticus* have not previously been described. The white, cottony-woolly aerial mycelium makes rapid growth (8–10 cm. in 10 days), exuding a somewhat sour odour. The hyaline hyphae form numerous clamp-connexions. The rare terminal or intercalary chlamydospores are oval, 9–12×5–7 μ , and the oidia, occurring in scattered short chains on the aerial mycelium, are cylindrical, 7–8×3–4 μ . Some cultures produced small, soft, white sporophores with regular pores.

Armillaria mellea was the most important agaric. *Collybia platyphylla*, *Hypohoma fasciculare* [34, p. 816], *Paxillus atrotomentosus*, *Pholiota squarrosa*, *Pleurotus mitis* [29, p. 231], and *Tricholoma rutilans* though rarely found are believed to be much more prevalent than the records of the present study would suggest. *Trichoderma viride* was common, while common agents of blue stain included *Ophiostoma penicillatum*, *O.* [*Ceratocystis*] *piceae*, and *O. olivaceum* (spruce), and *O.* [*C.*] *pini* (pine). A number of other miscellaneous species, of which no detailed investigations were made, are listed.

The occurrence of sporophores on stumps is described in part II. *A. mellea* was the most prevalent species on spruce, which was also extensively colonized by *Peniophora gigantea*, forming sheets covering hundreds of sq. cm. and largely composed of coalescent sporophores. More than 20% of the stumps harboured *G. brinkmannii*, *Polystictus abietinus*, *S. sanguinolentum*, and *Coniophora* spp. *Peniophora gigantea* was predominant on pine, followed by the other species common on spruce.

Part III deals with the rotting fungi cultured from boring cores. They were classed in 4 groups: (1) *A. mellea* and *F. annosus* [36, p. 505], both important sources of damage to growing trees; (2) species such as *P. gigantea*, *G. brinkmannii*, *S. sanguinolentum*, and *Polystictus abietinus*, which must almost invariably have attacked the stumps after felling; (3) unidentified mycelia (types I–X) of fairly frequent occurrence; and (4) unclassified mycelia.

Part IV is concerned with the occurrence of rot mycelia in different parts of the stump. The stump fungi were found almost invariably in larger numbers in the top of the stump than in the bottom. On the other hand, *F. annosus* and *A. mellea* were slightly more prevalent in the lower parts of the few samples involved.

Analysis of stump infection and decomposition, described in part V, revealed considerable differences in the severity of attack by the several species. Weight losses exceeding 30% were caused by *Peniophora gigantea*, *F. pinicola*, *Polyporus borealis*, *L. saepiaria*, *F. annosus*, and mycelia types I and X. Infection progressed more rapidly in specimens kept under moist conditions. In pine decay was slighter in heart- than in sapwood [35, p. 58], but in spruce there was little difference between the two. In the south of the country extensive decay was present in spruce after 5-6 yr. but in the north a stump may remain in good condition for as long as 20. In pine the process may be complicated by the production of large quantities of resin, with a resultant increase in the density of the dry wood which tends to debar fungal invasion.

With the exception of *A. mellea*, which appears invariably to grow upwards from the root to the top of the stump [35, p. 800], and possibly of *F. annosus* [loc. cit.], infection presumably takes place through spores. The apparent difficulty of germination in the outer parts of the sap- and in the central heartwood may be attributable to the copious flow of resin, as indicated above (plus poisonous substances in pine), and the low moisture content, respectively.

PERSSON (A.). **Über den Stoffwechsel und eine antibiotische wirksame Substanz von *Polyporus annosus* Fr.** [On the metabolism and an antibiotically active substance of *Polyporus annosus* Fr.]—*Phytopath. Z.*, **30**, 1, pp. 45-86, 7 fig., 2 diag., 7 graphs, 1957. [65 refs.]

There were equally great or greater differences within individual strains of *Polyporus* [*Fomes*] *annosus* isolated from pine and spruce in various parts of Sweden [33, p. 190 *et passim*] (and a few, including two from larch, from other countries) in their response to temperature than between these strains; 38° C. was evidently lethal for most, but 2 from pine and 1 from spruce, transferred after 9 days to 20°, resumed growth.

Using Gentile's method [31, p. 253], a permanent toxigenic wilt was induced in tomato seedlings by contact with filtrates of the fungus, 1 isolate from pine in Scania causing particularly severe symptoms of leaf shrivelling and grooving of the stem. Filtrates from cultures with NH_4NO_3 as a N source were more injurious than those given $\text{Ca}(\text{NO}_3)_2$.

Of the 3 synthetic nutrient solutions used, Raulin's promoted more copious mycelial growth than Richards or Czapek-Dox. Both NH_4NO_3 and tartaric acid were of decisive importance in the development of *F. annosus*, the acid being chiefly concerned in toxin formation. Growth was also abundant in semi-synthetic solutions containing corn steep liquor, but the toxicity of the filtrate in the tomato test was slight. Sugar and tartaric acid decomposition were closely correlated with the phase of max. growth of the fungus; variations in pH and antibiotic activity were expressed by analogous curves. A pine isolate grew best at pH 4-6 and a spruce at 8.

Tryptophane and histidine were the only amino acids among 12 tested that were unsuitable as N sources. Of primary importance and rapidly utilized were alanine, asparagine, cystine, glycine, and asparaginic acid.

TOUZÉ-SOULET (JANE M.) & MONTANT (C.). **Les acides organiques de quelques Basidiomycètes supérieurs.** [The organic acids of some higher Basidiomycetes.]—*C. R. Acad. Sci., Paris*, **245**, 21, pp. 1825-1827, 1957. [11 refs.]

The non-volatile aliphatic and mineral acids present in the sporophores of *Polyporus*

sulphureus, *Coriolus* [*Polystictus*] *versicolor*, *C.* [*Polyporus*] *hirsutus*, *Xanthochrous* [*P.*] *hispidus*, and *Lenzites quercina*, identified by paper chromatography, are listed.

BLEW (J. O.) & KULP (J. W.). **Comparison of wood preservatives in Mississippi post study. (1957 Progress Report).**—*Rep. For. Prod. Lab., Madison*, 1757, 16+2 [unnumbered] pp., 1 fig., 1957.

Details and tabulated results of preservative treatments applied to posts of southern yellow pine [*Pinus palustris*] in experiments started in 1936 are given [cf. 36, p. 562]. Some treatments are expected to give an average life of 30 years or more.

PANEK (E.). **Preservative treatment of Jack Pine and Longleaf Pine posts by the hot-and-cold bath and its boiling-in-water adaptation.**—*Rep. For. Prod. Lab., Madison*, 2085, 6+2 [unnumbered] pp., 2 fig., 1957.

Uninfected jack pine [*Pinus banksiana*] and longleaf pine [*P. palustris*] posts and those infected by [unspecified] mould, treated by the hot and cold bath (1–3 hr.: $\frac{1}{2}$ –2 hr.) [cf. 36, p. 626] and by a boiling-in-water adaptation (*Bull. Univ. Ga*, 49, 8, 1949), showed excessive retention of preservative and almost 100% sap wood penetration in those that were mould infected. Uninfected posts after 1 hr. hot bath and $\frac{1}{2}$ hr. cold had preservative retentions and penetrations below those of pressure-treated posts. With a hot bath lasting $1\frac{1}{2}$ hr. and cold 2 hr. preservative retention was adequate and penetration satisfactory except in jack pine posts treated by the boiling-in-water method, but the use of this method reduced excessive preservative retention in infected posts.

NATTI (J. J.). **Control of downy mildew of Broccoli with antibiotics and fungicides.**—*Plant Dis. Repr*, 41, 9, pp. 780–788, 1957.

In laboratory tests at New York State Agricultural Experiment Station, Geneva, spore germination of *Peronospora parasitica* [36, pp. 76, 676] was inhibited by actidione, ayfacticin, candicidin, endomycin, filipin, fungichromin, neomycin sulfate, pleocidin, thiolutin, tricothecin, and tyrothricin at 12 p.p.m. or less; anisomycin, polycycline, and streptomycin sulphate at 12–50 p.p.m.; and mycostatin at 100 p.p.m. Applied as sprays to broccoli plants in the greenhouse before inoculation with *P. parasitica*, anisomycin, mycostatin, streptomycin sulphate, and thiolutin were the most effective protectants of the antibiotics and manzate and spergon SL of the fungicides. Streptomycin acted as both a surface protectant and a localized systemic. In the field agristrep (37% streptomycin sulphate) at 3 lb./100 gal./acre gave almost complete control but caused severe bleaching. Next in effectiveness was agristrep at 0.6 lb. Copper-zinc and copper-manganese were the most effective fungicides, but caused some injury. Manzate (4 lb.) and spergon SL (3 lb.) were the most promising on the basis of control without injury.

CHIU (W.-F.) & WANG (C.-K.). **'Kwuting', a virus of Chinese Cabbage.**—*Acta phytopath. sinica*, 3, 1, pp. 31–43, 5 pl. (1 col.), 1957. [Chinese. Abs. from English summary.]

This disease, long known in N.E. and N. China, caused much damage in 1952. Study at the Peking Institute of Agriculture showed that it is transmissible both mechanically and by aphids. Symptoms on Chinese cabbage include vein-clearing, veinbanding, mottling, and malformation. On tobacco leaves only necrotic spots appear, but infection of *Nicotiana glutinosa* and spinach is systemic. At 25–28° C. the incubation period is 13–14 days, or less with shorter exposure to light. The virus is non-persistent in *Rhopalosiphum pseudo-brassicæ* and *Myzus persicæ*, which transmitted it after 5 min. feeding. There is no evidence for seed transmission. The virus is infectious after storage at 20–22° for 24 hr., but is

inactivated after 48 hr. and also at 60° and at a dilution of 1:3,000. It is considered to be a strain of turnip mosaic virus. It differs from Chinese cabbage mosaic virus [str. of cauliflower mosaic virus].

SHIRAHAMA (K.). **Studies on Radish mosaic disease and its controlling.**—iv+107 pp., 57 fig., 4 diag., 14 graphs, Agricultural Improvement Extension Work Conference, Tokyo, 1957. [Japanese. Abs. from English summary. 255 refs.]

The first report of radish mosaic in Japan [34, p. 69] was from the Kyushu district in 1927; the disease spread to Tokyo in 1932 and 1933 and since then has been very severe in these areas in some seasons, reducing yield by 30–40%. Infection occurs in the seedling stage, symptoms being masked by low temperatures in the autumn and by shade. The disease increases susceptibility to soft rot [*Erwinia* sp.] and downy mildew [*Peronospora parasitica*]. Varieties resistant to mosaic infection are Minowase and Nerina [35, p. 649].

The author classifies the viruses causing radish mosaic [cf. 37, p. 61] into the following groups on the basis of infectivity to *Nicotiana* and cabbage: turnip mosaic, Chinese radish mosaic, stock mosaic, cauliflower mosaic, cucumber mosaic, and a group of six unidentified strains. All, especially the cucumber mosaic group, are represented in the Tokyo area. Radish mosaic is neither seed- nor soil-borne, and is usually transmitted by *Myzus persicae*, *Rhopalosiphum pseudo-brassicae*, and rarely by *Brevicoryne brassicae*. A significant correlation was observed between the incidence of the disease and the numbers of alate *M. persicae* and *R. pseudo-brassicae*. Of the winged aphids found on radish seedlings 6–25% were viruliferous. In late-sown crops disease incidence was low, owing to the short infection period.

The best means of control in Tokyo province lie in cultivating radishes between rows of upland rice and applying 3 insecticidal sprays after germination. In warmer areas the infection period is longer and the use of resistant varieties and more sprays is recommended. BHC is injurious to young seedlings and direct dusting should be avoided. Parathion and endrin are equally effective as insecticides.

BACHTHALER (G.). **Probleme und Technik des Zuckerrübenanbaues in der Türkei.** [Problems and technique of Sugar Beet cultivation in Turkey.]—*Zucker*, 11, 1, pp. 2–5, 4 fig., 1958.

Cercospora [beticola] is stated to develop early and cause heavy losses of sugar beet in the maritime climate of Adapazari [35, p. 805]. The crops are sprayed several times with Bordeaux mixture, and of late years the Kleinwanzleben *Cercospora*-resistant variety [36, p. 443 *et passim*] has been introduced for cultivation in the intensively infected regions. Other diseases include [unspecified] red rot; girth scab [cf. 36, p. 743], the most widespread root infection; heart and dry rot [boron deficiency]; and mildew (*Microsphaera betae*). Beet yellows virus [map 261] is important in steckling stands. Experiments are in progress to determine whether curly top virus [37, p. 193] is transmitted by *Euttetix tenella* in Turkey.

TETEREVNIKOVA-BABAYAN (Mme D. N.) & KHACHATRYAN (M. S.). **On the chemical method for controlling the powdery mildew of the Melon.**—*Nauch. Trud. erevansk. Univ.*, 49, pp. 109–118, 1955. (Armenian summary.) [Abs. from English translation by D.S.I.R. of *Referat. Zh. Biol.*, (1956), 7, No. 26949, 1956. Received 1957.]

Investigations in Armenia on the local melon var. Khatunarkhskii attacked by powdery mildew (*Sphaerotheca fuliginea* and *Erysiphe cichoracearum* f. *cucurbitacearum*) [16, p. 364] showed that a 1% colloidal S at 400 l./ha. is an extremely effective control. Calcium polysulphide at 0.5% is effective and, in contrast to pure S, does not burn.

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